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DEVELOPMENT AND IMPLEMENTATION OF AN ESCAPEMENT GOAL POLICY FOR THE RETURN OF CHINOOK SALMON TO THE KENAI RIVER[1]

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ABSTRACT

The Kenai River, Alaska, supports large recreational and commercial fisheries for chinook salmon *Oncorhynchus tshawytscha* and the returns of these fish are fully utilized from both an allocative and biological perspective. Until 1988, these fisheries have lacked a clear statement of management objectives. During the 1988 public regulatory forum provided by the Alaska Board of Fisheries, Alaska Department of Fish and Game resource managers recommended that an escapement goal policy be implemented for these fisheries. An escapement goal policy for both the early and late runs of Kenai River chinook salmon was adopted by the Alaska Board of Fisheries and was implemented through regulation during 1989. The historic data, including estimates of total return, by which these escapement goals were derived are presented. Also, a migratory time density model is developed by which projections of escapement can be computed to implement the escapement goal policy during the fishing season.

KEY WORDS: Kenai River, chinook salmon, *Oncorhynchus tshawytscha*, management objectives, Alaska Board of Fisheries, escapement goal, migratory time density.

INTRODUCTION

Effective resource management requires a clear statement of policy and a mechanism by which those policies can be measured and evaluated. Management policies are necessary for the controlled exploitation of a population in order to obtain the maximum benefit as defined by the regulatory authority. Until recently, the fisheries for chinook salmon *Oncorhynchus tshawytscha* in the Kenai River (Figure 1) have lacked clear and definitive management objectives. The continued growth of the major fisheries that harvest chinook salmon of Kenai River origin (Figure 2) has fueled severe allocative disputes and has heightened both public and agency concern that stocks are vulnerable to over-exploitation.

In December 1988, the Alaska Board of Fisheries[1] adopted a management plan for the early and late returns of chinook salmon to the Kenai River (Appendix A). The plan stipulates both: (1) the specific policy, or escapement goal, by which the fisheries in question will be managed; and (2) the manner in which selected fisheries are to be managed in the event of a conservation shortfall. This policy will be implemented for the first time in 1989.

The objective of this report is to develop the rationale for: (1) the selection of specific escapement goals, and (2) the implementation of the escapement goal policy. Determination of an escapement goal for Pacific salmon *Oncorhynchus spp.* is largely a matter of compiling return statistics and estimating the resulting production from a given brood or escapement. As a result, the portion of this manuscript that addresses development of escapement goals is largely a summary of the Alaska Department of Fish and Game's best assessment of the magnitude of chinook salmon returns to the Kenai River and includes both fishery statistics and estimates of inriver abundance. Implementation of an escapement goal policy requires timely estimates of run timing and abundance such that harvests in appropriate fisheries can be regulated to achieve the escapement goal. Consequently, the discussion of implementation of escapement goals depends upon historical assessment of the timing of chinook salmon returns to the Kenai River.

STOCK STATUS

The Kenai River has two stocks of chinook salmon: (1) an early run which enters the river from mid-May through June, and (2) a late run which enters the river from late June through early August (Burger et al. 1985). Although the early and late runs undoubtedly overlap in timing, the degree of overlap has not been estimated. For purposes of the management plan and the following analyses, 1 July has been established as the separation date between the early and late chinook runs. Fish accounted for prior to 1 July in either the upper Cook Inlet marine harvest or in the inriver return to the Kenai River are considered to be of early run origin while those that are accounted for on or after 1 July are considered to be of late run origin.

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[1] The State's regulatory authority for fisheries.

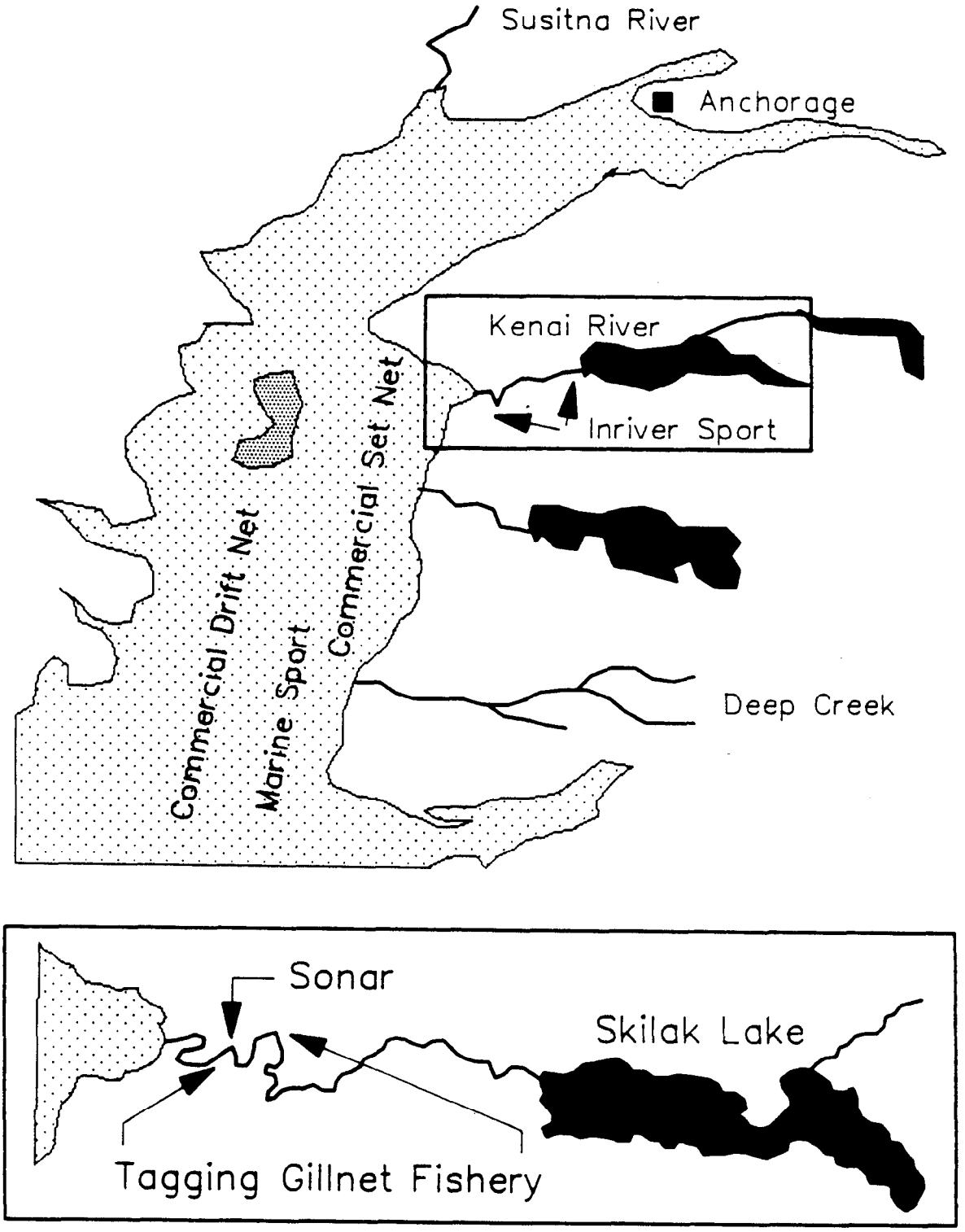

Figure 1. Map of upper Cook Inlet and Kenai River.

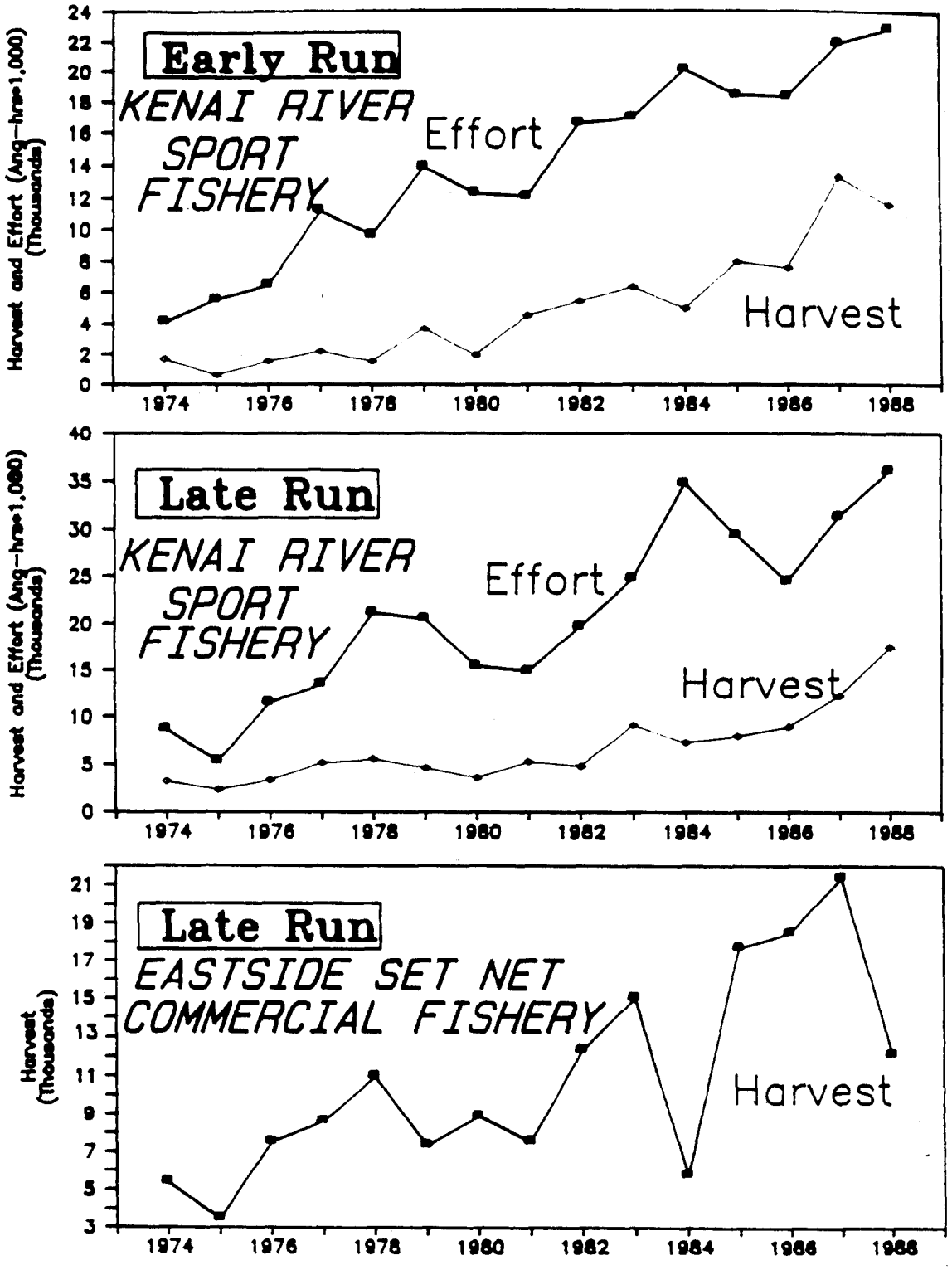

Figure 2. Fishery statistics for selected fisheries that are sustained by Kenai River chinook salmon, 1974-1988.

General Methods

The following is a summary of the various data bases that are available to assess the magnitude and timing of chinook salmon returns to the Kenai River, while specific analytical methodology is presented later in the report.

Statistics from sport fisheries in the Kenai River have been collected from creel surveys since the early 1970's (Hammarstrom 1988 and Hammarstrom et al. 1987) and postal questionnaires since 1977 (Mills 1987). The estimates of annual harvest by the two methods are generally similar, but creel surveys are used as the preferred estimate where available, as they provide temporal estimates (daily and weekly) of harvest, fishery-specific estimates of effort, and estimates of total harvest and catch. The number of fish caught and released in the Kenai River sport fishery is estimated by subtraction of harvest from catch.

Harvest and landing statistics from commercial fisheries in Cook Inlet have been available through sales receipts (fish tickets) since 1966, but estimates of effort (number of units of gear by fishing period) have not been collected consistently.

Estimates of total inriver return have been investigated by two independent methods, tagging and hydroacoustic assessment (sonar), since 1984. A tagging study was initiated for the late run in 1984 and was expanded in 1985 to include the early run (Conrad and Larson 1987, Conrad 1988, Carlon and Alexandersdottir in press). Fish to be tagged are captured with drift gill nets in the lower portion of the river and subsequently recaptured in the inriver sport fishery. The relative precision (95% confidence intervals [CI]) of the estimates by run has ranged from 40% to 74%. Catch and effort data are recorded during the tagging process to provide temporal information that can be modeled as a test fishery (Fried 1985).

The feasibility of using hydroacoustics (i.e. sonar) to estimate inriver return has been investigated since 1984 (Skvorc 1986) although the first useable estimates were only achieved in 1987. Sonar has since been accepted as the best estimate of inriver abundance for that year. Currently, the precision of these estimates is unknown as an algorithm for variance has not been formulated. However, the large fraction of the time-space window sampled by this gear is probably indicative of a low variance for the seasonal estimate of abundance. Only limited data are available to directly compare the seasonal estimates of abundance by run between the two methods. Difference between the point estimates of the two methods has ranged from 17% to 86% of the sonar estimates (Conrad 1988, Carlon and Alexandersdottir in press). Although still in the research and development stage, it is anticipated that sonar will eventually replace the tagging program.

Both abundance assessment methods provide estimates of the total number of chinook salmon that enter the Kenai River. The magnitude of the spawning escapement is estimated by subtracting the sport harvest from the estimate of inriver return.

Early Run

Early run fish are harvested in both marine and freshwater fisheries. Marine harvests are from mixed stock recreational fisheries. The largest marine sport fishery occurs during May and June in waters off of Deep Creek (Figure 1) and has averaged approximately 2,300 fish since 1972 (Table 1). However, the harvest consists of a mix of stocks that originate from throughout upper Cook Inlet and the contribution of early run fish from the Kenai River is unknown. A large number of other stocks of upper Cook Inlet origin are also available at the Deep Creek fishery during this time frame; in particular, stocks destined for the Susitna River drainage (Figure 1) which outnumber early run Kenai River stocks by an order of magnitude (McBride et al. 1985). Other stocks of similar run timing that are likely contributors include the Anchor River, Deep Creek, Ninilchik River, and Kasilof River. Given these factors, it is unlikely that an accounting of the contribution of early run Kenai River fish in the Deep Creek fishery would alter any conclusions regarding stock status.

Migration of early run fish is relatively unimpeded from the Deep Creek fishery until they enter the lower Kenai River. Estimates of the inriver sport harvest are available since 1974 (Table 1 and Figure 3). Harvest in this fishery has not fallen below 4,000 fish since 1981 and a record harvest of 13,400 fish was realized in 1987. Total release in the sport fishery has been estimated since 1986 and has ranged from 4,500 to 5,800 fish annually. Total inriver return has been estimated since 1985 and has ranged from 16,000 to 27,000 fish annually (Table 1). Spawning escapement, the difference between total inriver return and sport harvest, has ranged from 8,000 to 19,500 fish since 1985.

Total estimated inriver exploitation for the early run ranged from 28% to 56% and has been at least 50% in 3 of the 4 years for which we have estimates (Table 1). It is unknown at this time if significant additional mortality was sustained from the release of fish in the sport fishery. The magnitude of the release has been substantial in comparison to the estimated early run spawning escapement. For the years 1986 through 1988, it is estimated that 23%, 47%, and 59%, respectively, of the early run spawning escapement was caught and released by sport fishermen (Figure 3). If significant mortality from these released fish was realized, then estimates of spawning escapement are too high and estimates of exploitation are too low.

Late Run

Late run fish are harvested in several marine fisheries in addition to the freshwater sport fishery. Most of the marine harvest of late run fish occurs during July and early August in the commercial set gill net fishery along the east side of upper Cook Inlet (Figures 1 and 4; Table 2). Record harvests were realized during each of the years 1985-1987 and ranged from 17,723 to 21,379 fish. Substantial under reporting is believed to have occurred during the 1988 fishery (Ruesch and Browning 1988), when reported harvest was 12,838 fish. The actual harvest in 1988 probably approaches the numbers harvested during the years 1985-1987. Estimates of stock contribution to this fishery are available only for the 1984 fishery (McBride et al. 1985). During 1984,

Table 1. Return statistics for the early run of chinook salmon into the Kenai River, 1974-1988.

Year	Kenai River Sport Harvest	Escapement	Total Return	Exploitation Rate
1974	1,685			
1975	615			
1976	1,554			
1977	2,173			
1978	1,542			
1979	3,661			
1980	1,946			
1981	4,525			
1982	5,466			
1983	6,360			
1984	4,956			
1985	7,971	8,001	15,972	49.9%
1986	7,561	19,519	27,080	27.9%
1987	13,281	12,362	25,643	51.8%
1988	11,601	9,279	20,880	55.6%
1985-1988 Average	10,103	12,290	22,394	45.1%

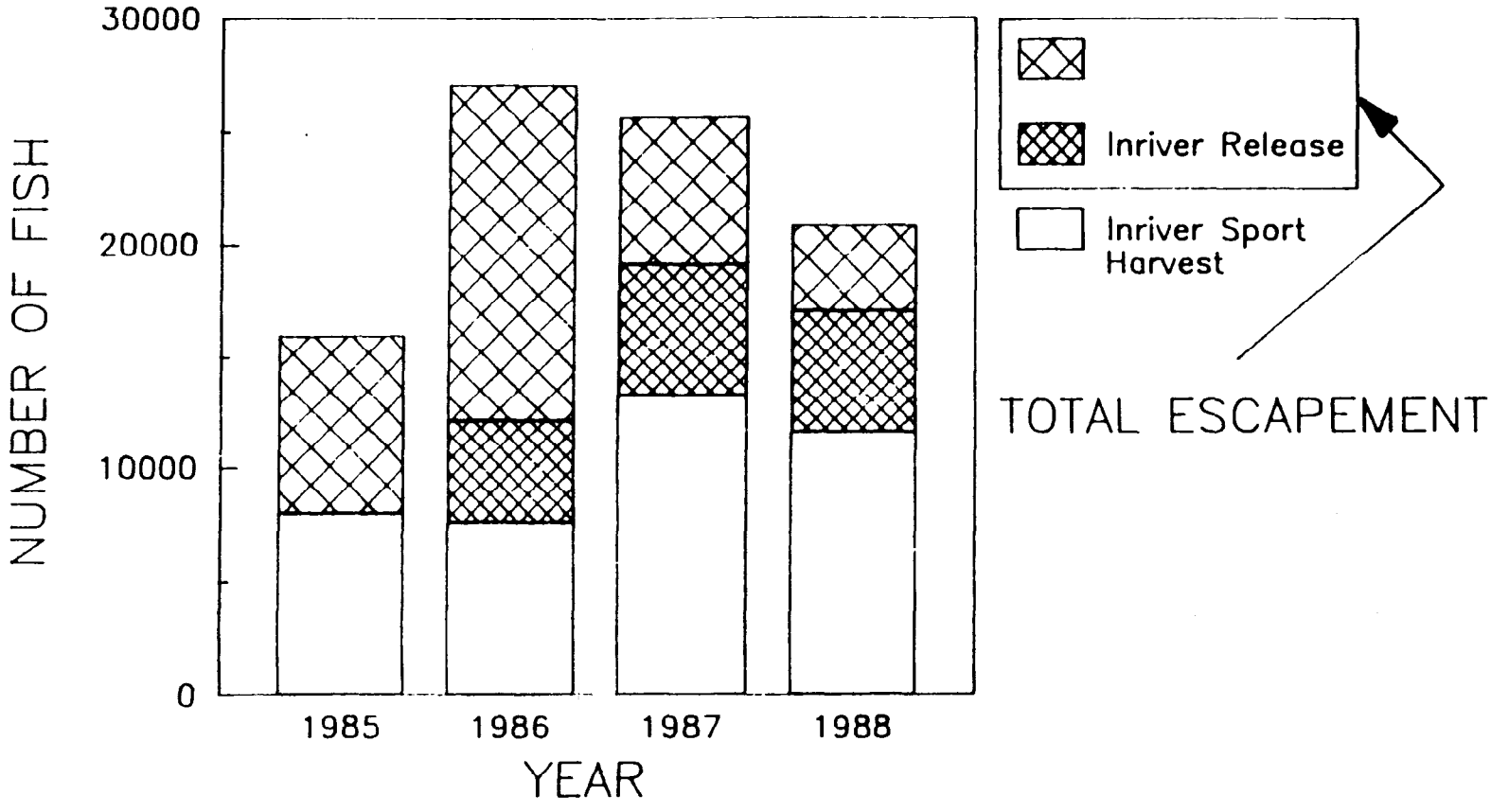

Figure 3. Total return statistics for early run Kenai River chinook salmon, 1985-1988.

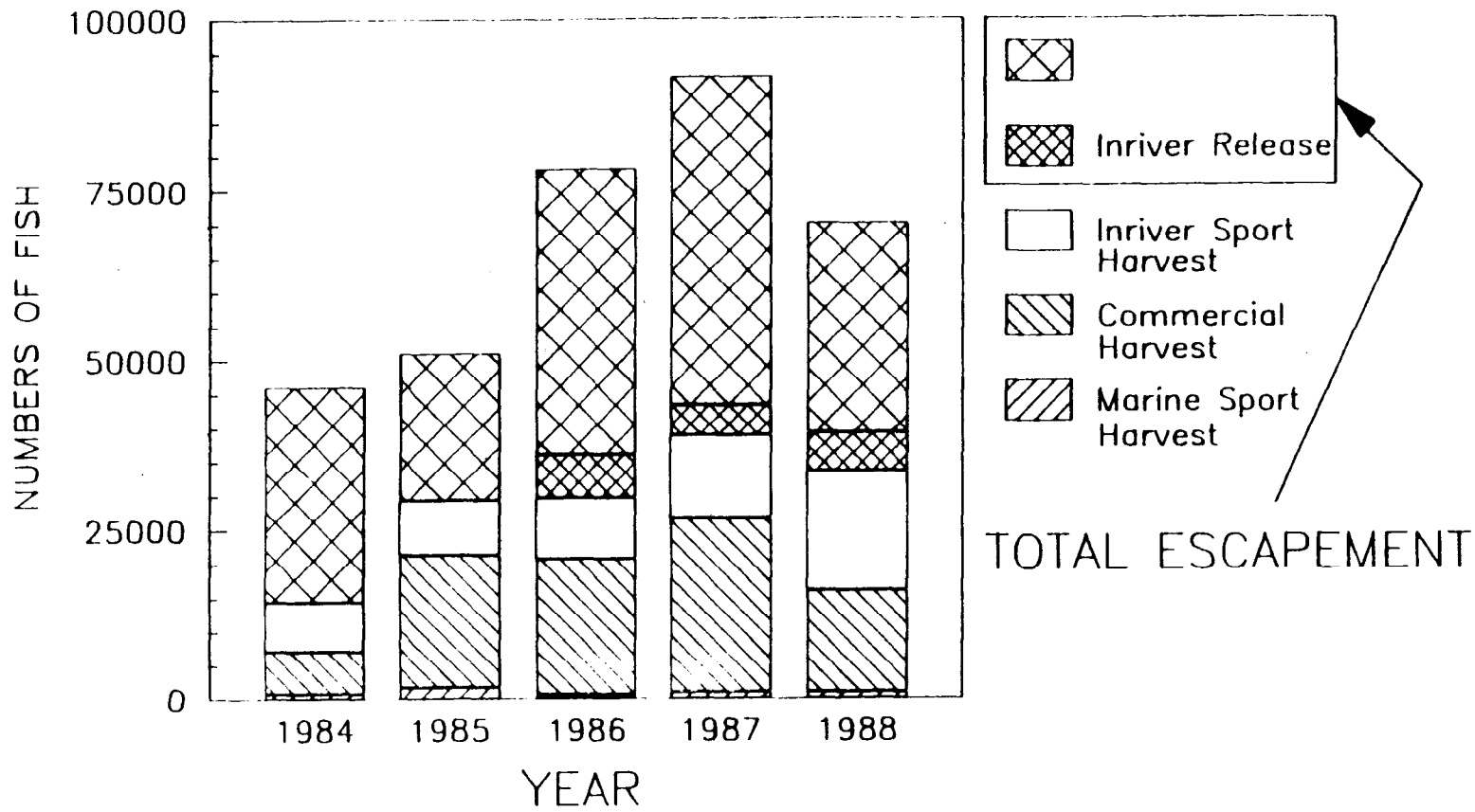

Figure 4. Total return statistics for late run Kenai River chinook salmon, 1984-1988.

Table 2. Return statistics for the late run of chinook salmon into the Kenai River, 1974-1988.

	Marine Harvest				In-River Return				
Year	E. Setnet Comm. Harvest	Drift Comm. Harvest	Deep Cr. Marine Sport Harvest	Total Marine Harvest	Kenai River Sport Harvest	Escapement	In-River Total	Total Return	Exploitation Rate
1966	6,063			6,063					
1967	5,847			5,847					
1968	2,771			2,771					
1969	2,934			2,934					
1970	4,667			4,667					
1971	3,066			3,066					
1972	5,140		1,250	6,390					
1973	4,059		491	4,550					
1974	5,403		100	5,503	3,225				
1975	3,497		345	3,842	2,355				
1976	7,543		1,382	8,925	4,477				
1977	8,647		366	9,013	5,148				
1978	10,964		2,693	13,657	5,578				
1979	7,363		1,164	8,527	4,634				
1980	8,903		747	9,650	3,608				
1981	7,565		170	7,735	5,285				
1982	12,358		1,173	13,531	4,810				
1983	15,043		1,707	16,750	9,174				
1984	5,805	448	835	7,088	7,376	31,796	39,172	46,260	31.3%
1985	17,723	1,891	1,731	21,345	8,055	21,708	29,763	51,108	57.5%
1986	18,507	1,577	679	20,763	9,004	48,559	57,563	78,326	38.0%
1987	21,379	4,323	1,000	26,702	12,237	52,787	65,024	91,726	42.5%
1988	12,838	2,212	N/A	15,050	17,512	34,496	52,008	67,058	48.6%
1984-1988 Average	15,252	2,090	1,061	18,189	10,837	37,869	48,706	66,896	43.4%

the contribution of late run Kenai River chinook salmon to the 3-ocean and 4-ocean components of the harvest was estimated at 79%. Those age components comprised 70% of the harvest during that year. Given this estimate of the late run Kenai River return, we consider the contributions of other stocks to this fishery to be inconsequential and have not attempted to partition the harvest by stock for other years. Harvests in the drift fishery are also believed to be comprised primarily of late run Kenai River origin and have averaged approximately 2,100 fish (of all stocks) since 1984. Sport harvest in the Deep Creek marine fishery during July also probably consists primarily of late run Kenai River fish and has averaged nearly 1,000 fish since 1972.

After passing through the marine fisheries, late run chinook salmon next begin their entrance into the lower Kenai River. Estimates of the inriver sport harvest are available since 1974 (Table 2 and Figure 4). Harvest in this fishery has not fallen below 7,000 fish since 1983 and a record harvest of 17,512 fish was realized in 1988. Total release in the sport fishery has been estimated since 1986 and has ranged from 4,500 to 6,300 fish. Total inriver return has been estimated since 1984 and has ranged from 29,700 to 65,000 fish. Spawning escapement, the difference between total inriver return and inriver sport harvest, has ranged from 21,700 to 52,800 fish since 1984.

Total exploitation for the late run has ranged from 31% to 58% with an average of 43% (Table 2). The number of fish released in the sport fishery is similar to that of the early run which represents 13%, 8%, and 16% of the estimated spawning escapement, respectively, since 1986 (Figure 4).

FORMULATION OF ESCAPEMENT GOALS

Several management policies have been proposed and/or implemented for chinook salmon stocks throughout Alaska and the Pacific west coast, including management for harvest levels, exploitation rates, and escapement goals. Chinook salmon returns to the Yukon River are managed under a system of flexible commercial catch quotas which are termed guideline harvest ranges (ADFG 1988). These levels of harvest were chosen as likely estimates of sustainable long term production. Chapman (1986) estimated that the optimum exploitation rate for Columbia River chinook salmon is 67% and overfishing would occur if harvest rates of these stocks exceeded 80%. Chinook salmon returns throughout southeast Alaska, British Columbia, and the west coast states are currently managed for escapement goals to achieve a rebuilding of the stocks and ultimately attain optimum sustained production (Pacific Salmon Commission 1987).

Selection of the appropriate management policy is usually dependent upon the degree to which the population dynamics of the stock(s) in question are understood. For instance, guideline harvest ranges for the Yukon River were developed in the absence of estimates of total return. Management policies that speak to either exploitation rates or escapement goals are usually based on historical production performance and require estimates of total return. While these two management policies should deliver maximum sustained yields if properly implemented, they differ in several respects (Hall et al. 1988).

Constant exploitation rate policies usually deliver more stable fisheries in that some level of fishing is realized for even the weakest returns. However, this apparent stability in the fishery is realized at the cost of a higher risk of continuing to exploit declining or extremely low stock levels. Escapement goal policies provide a measure of safety for weak returns, while also allowing for maximization of sustained yields.

For these reasons, it was the recommendation of the Alaska Department of Fish and Game to adopt an escapement goal policy for Kenai River chinook salmon as the best means to realize sustained yields.

Sustained Production

The methodology for determination of escapement goals for chinook salmon is limited. Stock-specific brood tables are rarely available and relationships between production and rearing area have not been quantified for this species. A common approach is to select a level of escapement from historical records as the goal, usually either a peak (Pacific Salmon Commission 1987) or an average (ADFG 1988) value.

For Kenai River chinook salmon, we developed a very simple model to estimate the necessary escapement to produce a selected level of return:

Escapement Goal = Selected Level of Total Return/Average Rate of Return.

The key parameter in this model is estimation of an average rate of return for Kenai River chinook salmon. The limited number of years for which we have measured total returns precludes the ability to compile brood tables and complete a classic return-per-spawner analysis. While we have not directly measured rates of return for Kenai River stocks, we have no reason to believe that these stocks are either more or less productive than other stocks of chinook salmon. Therefore, we examined the available literature for information regarding rates of return for chinook salmon. The available information regarding rates of return for west coast chinook stocks has been exhaustively examined as part of the Pacific Salmon Treaty processes between the United States and Canada for the Yukon River (Brannian in press) and the Pacific west coast (Pacific Salmon Commission 1987). While rates of production varied from one to 10 returning fish per spawner, technical reviewers of this information cautioned that the higher rates of return were probably overestimates of production as a result of: (1) incomplete enumeration of escapements, and (2) inclusion of marine harvests of immature fish. For both the Yukon and Pacific west coast negotiations, an average rate of return of 3 to 1 was chosen as the most likely estimate of long term production. We chose this rate of production in lieu of specific information for Kenai River stocks.

Given this average rate of production (three returning fish per spawner), estimation of an escapement goal and projected harvests is a simple matter of selecting a targeted level of return and dividing by three.

Management Options

Selection of targeted levels of return was conducted through the public process provided by the Alaska Board of Fisheries. Given the limited number of years for which total return was estimated, three options for targeted levels of return were identified:

Option for Targeted Level of Return	Early Run		Late Run	
	Level of Return	Spawning Escapement Goal	Level of Return	Spawning Escapement Goal
1. Smallest Measured Return	16,000	5,300	46,000	15,500
2. Average Measured Return	22,000	7,300	67,000	22,300
3. Largest Measured Return	27,000	9,000	92,000	30,600

Early Run:

The Board of Fisheries chose to target the largest measured return (Option 3) and manage for an escapement goal of 9,000 spawning fish (see Appendix A). For projected escapements of less than 9,000 fish, additional restrictions to the inriver sport fishery will be imposed. In consideration of the high rate of exploitation on the Kenai River early run and unknown effects of the large component of released fish in the spawning escapement, the efficiency of the inriver fishery, when spawning escapement was projected to be below 9,000 fish, was reduced by eliminating the use of bait. If the spawning escapement is projected to be below 5,300 (Option 1), no fishing time will be offered for the inriver fishery. If spawning escapement is projected to be between 5,300 and 9,000 (Options 1 and 3), a fishery will occur although time and area restrictions and/or mandatory catch and release will be implemented. If spawning escapement is projected to be above 9,000 (Option 3), the ban on the use of bait for the inriver fishery will be lifted as well as any other restrictions that may have been implemented.

Late Run:

The Board of Fisheries chose to target the average measured return (Option 2, see Appendix A) and manage for an escapement goal of 22,300 fish. For projected spawning escapements of less than 22,300 fish, additional restrictions to the inriver fishery will be imposed. If the spawning escapement is projected to be below 15,500 (Option 1), no fishing time will be offered for the inriver sport fishery and the marine commercial fisheries. If spawning escapement is projected to be between 15,500 and 22,300 (Options 1 and 2), an inriver sport fishery will occur although time and area restrictions and/or mandatory catch and release will be implemented for the inriver sport fishery. If the spawning escapement is projected to be above 22,300 (Option 2), no further restrictions will be implemented.

IMPLEMENTATION OF SPAWNING ESCAPEMENT GOALS

Successful implementation of this management policy requires timely and accurate projections of spawning escapement. Since spawning escapement is estimated as the difference between total inriver return and inriver sport harvest, this will require timely and accurate projections of these parameters.

Methods

The following data bases were used as input for estimation of the migratory timing of chinook salmon into the Kenai River: (1) inriver test gill net fishery; (2) sonar; (3) inriver sport fishery statistics including effort, harvest-per-unit-effort (HPUE), catch-per-unit-effort (CPUE), harvest, and catch; and (4) commercial fishery statistics from the Central District drift gill net and east-side Central District set gill net fisheries.

Migratory Time Density Statistics:

The distribution over time of a salmon migration past any fixed location (e.g. a tagging fishery, sonar site, etc.), is defined as a conservative characteristic and can be described by a migratory time distribution function (Mundy 1982). An empirical distribution or daily cumulative proportions can be calculated for each year of data and for each data base described above. These data bases consist of values, for instance counts or harvests by day (t). These values were accumulated for each run to calculate a total (N) for the run. For each day, t, the accumulated value to date (n_t) was also calculated. For each day, t, and year i, a cumulative proportion, p_{ti}, was calculated where:

$$p_{ti} = n_{ti}/Ni \qquad (1)$$

For each year, the set P of all cumulative proportions $\{p_{1i}, p_{2i}, .., p_{ti}\}$ represents the annual empirical cumulative distribution function (CDF), where each p_{ti} is the cumulative proportion of the total that has passed by time or day t. The mid-point of the migration, or median of the distribution, is reached or passed when p_{ti} is greater than or equal to 0.5.

For any day the mean cumulative proportion, $p_{t\cdot}$, over all years is calculated as,

$$p_{t\cdot} = \frac{1}{m} \sum_{t=1}^{m} p_{ti}, \qquad (2)$$

with variance,

$$Var(p_{t\cdot}) = \frac{1}{m-1} \sum_{t=1}^{m} (p_{ti}-p_t)^2 , \qquad (3)$$

At any point in a migration, the mean cumulative proportion to date can be used to estimate the expected total given the number known to have passed to date. Since n_{tj} represents the number passed by day t in year j, then the expected total for that year, N_j, will be,

$$N_j = \frac{n_{tj}}{p_t.} \qquad (4)$$

and the variance of N_j by,

$$Var(N_j) = n_{tj}^2/p_t.^2 \; (Var(n_{tj})/n_{tj}^2 + Var(p_t.)/p_t.^2 \qquad (5)$$

For each data set a mean migratory time distribution function was computed for the early (Appendix B) and late (Appendix C) runs. The variance and 90% confidence intervals were also estimated for each cumulative proportion, p_t. To examine the degree of consistency within and between data sets, we compared both: (1) the median or mid-point, and (2) the date at which the relative precision for the 90% CI of the estimates of cumulative proportions is less than or equal to 20% of the point estimate.

Tagging Fishery:

For the inriver test gill net fishery, several mathematical expressions for daily catch-per-unit-effort (CPUE) were examined. The primary objective of the inriver gillnetting is to capture fish for tagging, fishing time and area of the fishing effort is not held constant. Daily estimates of CPUE were correlated with daily abundance estimated from sonar data for 1987 and 1988. Catch-per-crew consistently exhibited the highest correlation of the statistics examined with the abundance data and so was selected as the variable used (or the n_{ti}) to estimate the mean expected cumulative proportion for the run entering the river. Daily cumulative proportions and their means and variances were computed for these data for the years 1985-1988.

Inriver Sport Fishery:

Fishery statistics were compiled separately for the guided and unguided fisheries. Daily estimates of CPUE and HPUE were directly available from angler interviews and were computed as catch (or harvest) per angler-hour for completed-trip interviews. These data were collected for virtually each day of the fishery. Daily estimates of cumulative fishing effort (cumulative angler-hours to date) were computed as follows. First, cumulative mean effort was computed for each day within 2-week time strata (5/16-5/31, 6/1-6/15, 6/16-6/30, 7/1-7/15, and 7/16-7/31) and was a simple average of all counts of anglers in the creel survey to date within that 2-week stratum. Each day's estimate of cumulative fishing effort was the product of the cumulative number of potential fishing hours within that 2-week stratum, and the cumulative mean effort. Daily estimates of effort were then computed by subtraction. Daily estimates of catch and harvest were the product of daily CPUE (or HPUE) and daily effort.

Inriver sport fishery data for the early run were only available since 1986. Data prior to this time were collected from 1 June and so did not provide migratory timing information for that portion of the fishery that occurs in

May. Daily angler counts and daily estimates of CPUE and HPUE for the late run were only available since 1984.

Commercial Fishery:

Although projections of commercial harvest are not specifically called for in the management plan, we investigated the potential for commercial fishery statistics to provide an independent data set by which to assess run timing and/or strength. Means and variances were calculated for each selected fishery using catch-per-fishing-period data. The Central District east-side set gill net and drift fisheries were the largest commercial harvesters of late run Kenai River chinook salmon (Table 2) and were selected for this reason. We also selected the Salamatof beach portion of the Central District east-side set gill net fishery due to its close proximity to the Kenai River (Tarbox personal communication).

Results

The cumulative proportions were calculated for all data sets and years (Appendix B and C) and the 50% point of each run, the mean date of 50%, and the point in the run at which the relative precision falls below 20% are compared for all the data sets (Table 3).

Inriver Abundance:

The inriver tagging fishery exhibited a high degree of consistency between years (Table 3 and Figure 5), particularly for the early run. For both inriver tagging fishery data sets, the relative precision of the cumulative estimates is 20% or less (α=0.10) approximately 40% through each migration which corresponds to 7 June (day 23) for the early run and 18 July (day 18) for the late run.

The inriver tagging fishery migratory timing data were reasonably consistent with the sonar data. For the early run, the 1988 sonar data were consistently within the 90% confidence intervals of the historic composite for the inriver tagging fishery after 13 June (Figure 5). For the late run, both years of sonar data (1987 and 1988) were consistently within the 90% confidence intervals of the historic composite for the inriver tagging fishery after 21 July (Figure 5). The mean dates for the 2 years of inriver tagging fishery and sonar data are 1 day apart (Table 3).

Means and variances were also calculated for daily sonar data. A complete data set for the early run is only available for 1988 while 2 years of data are available for the late run (1987-1988).

We also examined sport CPUE data as a measure of the migratory timing for the inriver return. This analysis was limited to the early run since the late run fishery ends by regulation on 31 July and the late run migration extends into August. The mean dates for both CPUE data bases are consistently earlier than the migratory time density functions for the inriver tagging fishery. When the data are censored so as to set day 1 at May 21 for all data sets and all years, unguided sport CPUE provides a better measure of

Table 3. Summary statistics for migratory timing data base for early and late run chinook salmon return, Kenai River, 1984-1988.

		50% Date						Point of distribution when relat. prec. ≤ 20%[1]	
		1984	1985	1986	1987	1988	Grand Mean	Date	Cumulative % Run
Early Run:									
Tagging (catch/crew)			6/11	6/12	6/09	6/11	6/11	6/07	39%
Sonar						6/08	6/08		
Sport Fishery Effort	Guided			6/13	6/12	6/10	6/12	6/07	37%
	Unguided			6/14	6/10	6/10	6/12	6/13	57%
CPUE	Guided			6/11	6/07	6/08	6/09	6/06	45%
	Unguided			6/12	6/04	6/09	6/10	6/12	59%
Harvest	Guided			6/13	6/10	6/14	6/11	6/10	46%
	Unguided			6/14	6/11	6/11	6/12	6/13	56%
Late Run:									
Tagging (catch/crew)			7/19	7/23	7/23	7/20	7/21	7/18	42%
Sonar					7/23	7/21	7/22		
Sport Fishery Effort	Guided	7/17	7/18	7/18	7/18	7/18	7/18	7/08	15%
	Unguided	7/18	7/18	7/19	7/18	7/19	7/18	7/13	31%
CPUE	Guided	7/20	7/16	7/17	7/17	7/19	7/18	7/15	41%
	Unguided	7/20	7/17	7/15	7/17	7/17	7/18	7/12	30%
Harvest	Guided	7/20	7/23	7/23	7/21	7/20	7/20	7/17	40%
	Unguided	7/21	7/23	7/19	7/19	7/20	7/20	7/15	33%
Commercial Fishery:									
Total East-side Set Gill Net		7/16	7/23	7/18	7/23	7/19	7/18	7/14	35%
Salamatof Set Gill Net		7/18	7/29	7/28	7/28	7/25	7/24	7/28	67%
Drift Gill Net		7/10	7/26	7/19	7/27	7/22	7/19	7/25	72%

[1] Relative precision = size of 90% confidence interval relative to mean.

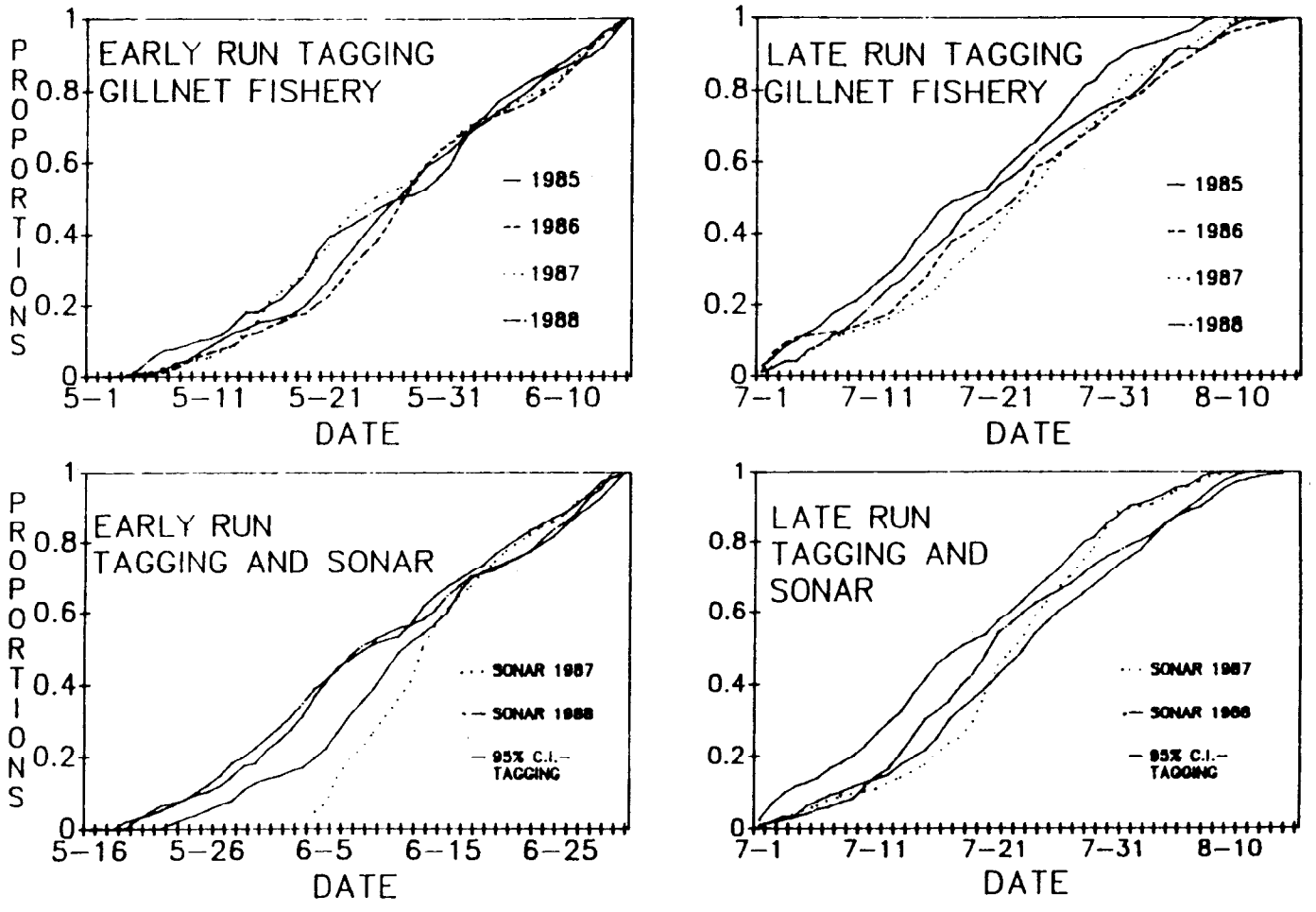

Figure 5. Comparative migratory timing curves for Kenai River chinook salmon as estimated from sonar and tagging gill net fishery data, 1985-1988.

migratory timing (Figure 6). Estimates of migratory timing from guided sport CPUE are consistently high in comparison to the inriver tagging fishery data.

Inriver Sport Fishery:

Projections of harvest are the most crucial fishery statistic to be estimated. For the early run, estimates of harvest with at least 20% relative precision 90% of the time can be projected at approximately the mid point of the run (Table 3). Projections of harvest for the late run sport fishery are more stable than the early run fishery, probably due to the shorter duration of the late run fishery. For the late run, estimates of guided harvest with at least 20% relative precision 90% of the time can be projected at approximately 40% through the migratory time density function (17 July), while estimates of unguided harvest can be projected at approximately 33% through the migratory time density function (15 July) (Table 3).

Projections of most of the other sport fishery statistics exhibit similar variability as observed for harvest data (Table 3). The most notable exception is guided effort for both runs; estimates of this statistic can be projected with at least 20% relative precision 90% of the time at approximately 37% for the early run (7 June) and 15% for the late run (8 July). The stability in these estimates is probably a result of the more regimented nature of the guided fishery.

Marine Commercial Fisheries:

None of the commercial data sets appear particularly useful in assessing inriver run timing. The Salamatof beach set gill net and drift gill net data sets are more variable than any other data set as exhibited by the late dates at which estimates of harvest can be projected with at least 20% relative precision 90% of the time (28 July for the Salamatof beach fishery and 25 July for the drift fishery). The total east-side set gill net fishery exhibits a similar degree of variability as the inriver data sets. However, the timing of this fishery precedes the inriver assessment sites by only a few days and so does not provide a substantially earlier assessment of run timing.

We further explored the potential of using east-side set gill net fishery statistics as an independent estimate of total return of late run chinook salmon. Since this fishery is primarily managed to target specific stocks of sockeye salmon, Eggers (1988) suggested that the exploitation of late run chinook salmon in this fishery (μ_{KS}) is a function of the exploitation of late run Kenai River sockeye salmon *Oncorhynchus nerka* (μ_{RS}) (the major stock of sockeye salmon in the Upper Cook Inlet) in this fishery. The contribution of Kenai River sockeye salmon has been estimated through 1986 with scale patterns analysis (Waltemyer and Tarbox 1988). We included preliminary estimates of Kenai River contribution for 1987 and 1988 (Tarbox personal communication). As stated previously, we assumed that all chinook salmon harvested in this fishery to be of late run Kenai River origin.

For the 5 years for which we have estimates, approximately 79% of the variation in exploitation of this fishery on late run chinook salmon can be

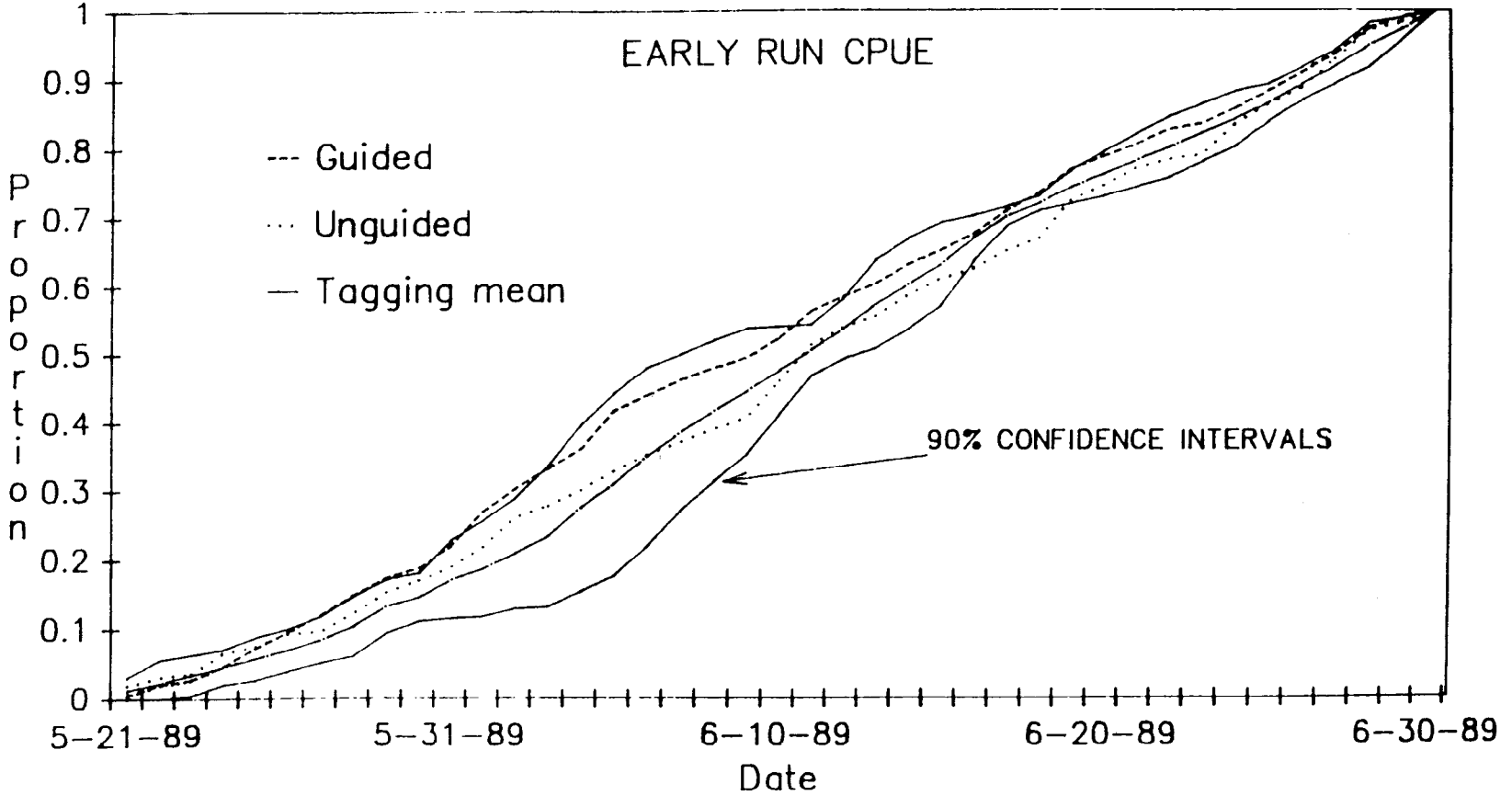

Figure 6. Comparative migratory timing curves for Kenai River chinook salmon as estimated from tagging gill net and sport CPUE data, 1985-1988. Data are censored so all time-series start on 21 May.

explained by the exploitation of the fishery on late run Kenai River sockeye salmon with a linear model (Figure 7). This relationship is driven by two data points: the low exploitation of late run chinook salmon realized in 1984 and the high exploitation of late run chinook salmon realized in 1985. The 1984 fishery was characterized by reduced fishing time due to less-than-expected returns of sockeye salmon (Ruesh 1988) and exploitation was commensurately lower. The 1985 fishery was characterized by some additional fishing time (Ruesch 1988); primarily as a result of greater-than-expected returns of Kasilof River sockeye salmon. The byproduct of this strategy was an increased exploitation rate for both sockeye and chinook salmon of Kenai River origin.

This relationship can provide an independent estimate of total return of late run chinook salmon to upper Cook Inlet. For the 1989 season, a total of 4 million sockeye salmon are forecasted to return to upper Cook Inlet (Geiger and Savikko ed. 1989). This forecast is somewhat below recent years and substantial additional fishing time is not anticipated. Given this, we assume a normal fishing pattern[2] and selected the arithmetic average as the most likely expression of exploitation of this fishery on Kenai River sockeye salmon for 1989 (μ_{RS} = 0.31). Based on the linear model (Figure 7), the estimate for μ_{KS} is 0.29. Using the migratory time density function explained above, we will obtain a projection of total harvest of chinook salmon in the east-side set gill net fishery (H_{KS}) with reasonable confidence by approximately 14 July (Table 3). Total return (N_T) is then estimated as:

$$N_T = H_{KS}/\mu_{KS}.$$

Since this model relies on preseason forecasts which would be difficult to update during the season, we suspect that this procedure will only be useful in detecting extremely large deviations from expected abundance. For instance, this model is probably sufficiently sensitive to detect a smaller total return than any of the five returns that have been estimated since 1984 (approximately 46,000 fish). Given the preseason estimates of exploitation rate and a fishing pattern that does not significantly deviate from that of recent years, we would project a smaller total return than any that we have measured if $H_{KS} < 10,500$ chinook salmon.

If significant reductions or additions in fishing time are anticipated, then utilization of the 1984 or 1985 estimates of μ_{RS} would be appropriate.

Application

For the 1989 season, projections of spawning escapement will be computed as follows (Figure 8). First, inriver return-to-date will be estimated from sonar. If this system proves unreliable, inriver return-to-date will be estimated from tagging data. The average cumulative distribution (Appendix Table B1 and C1) for the inriver tagging fishery constructed from historical data will be used to estimate the cumulative proportion of the inriver

[2] Standard fishing time is set out in regulation at 2 days per week.

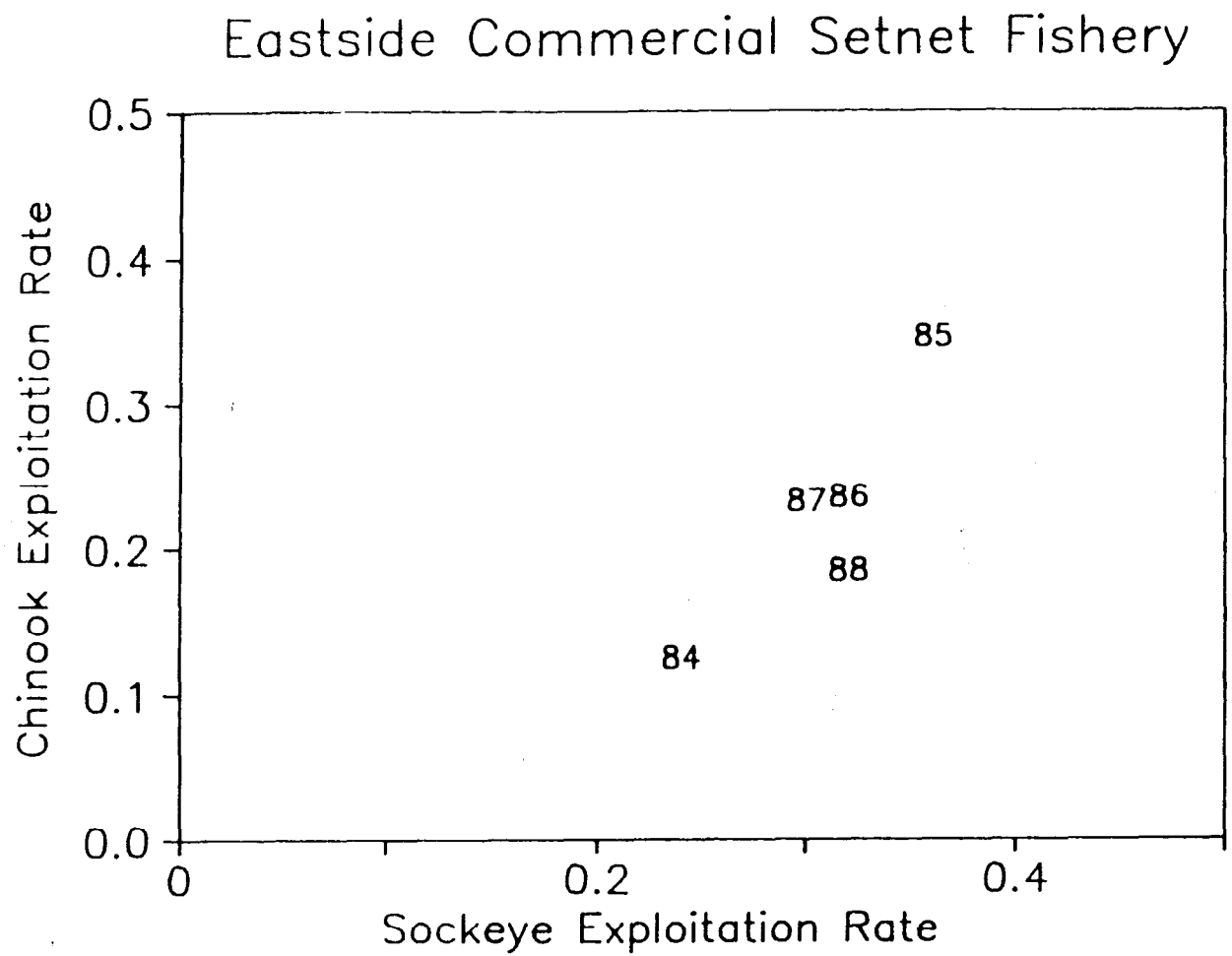

Figure 7. Exploitation of Kenai River chinook salmon in the east-side commercial set gill net fishery as a function of exploitation of Kenai River sockeye salmon, 1984-1988.

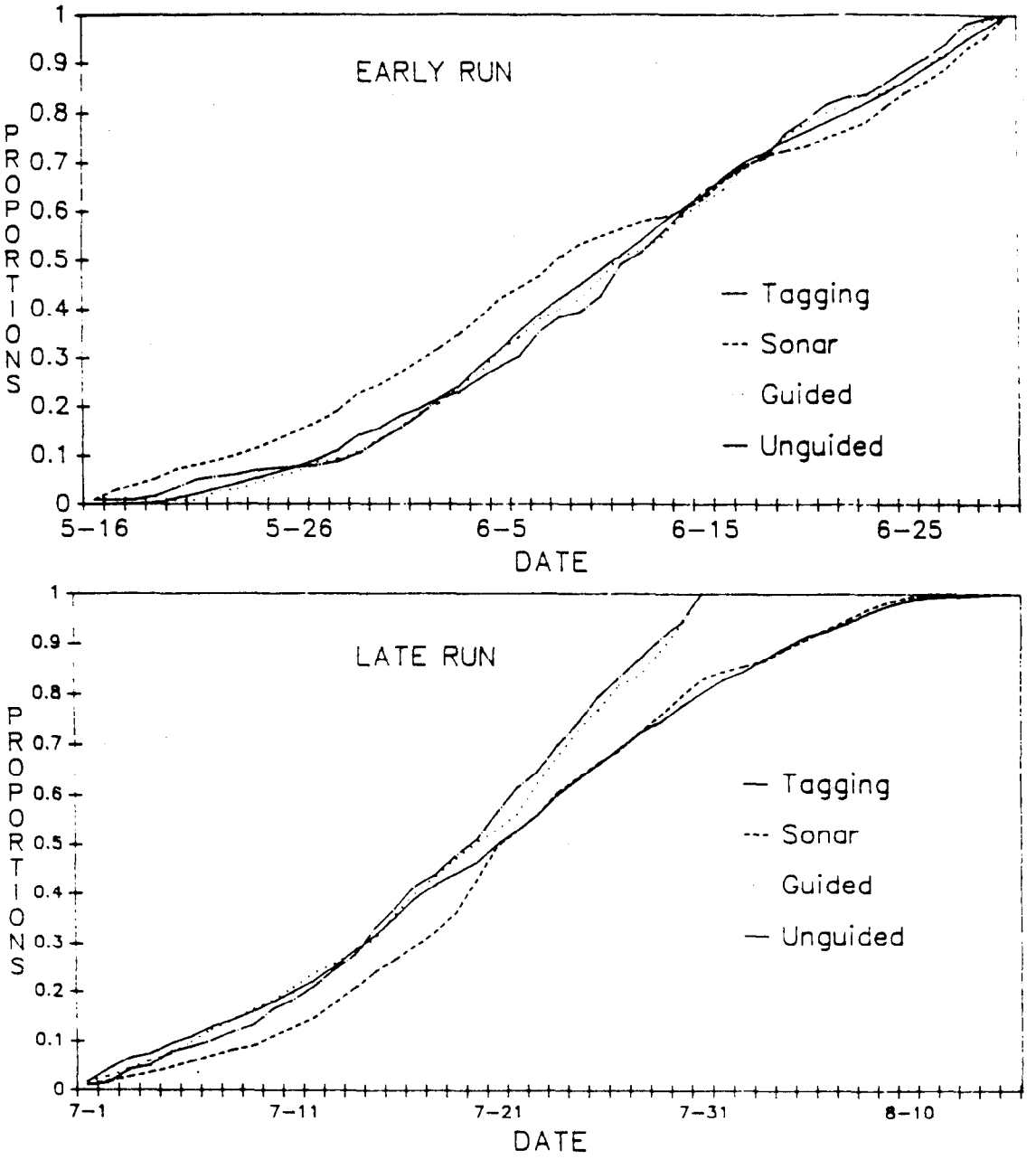

Figure 8. Comparative migratory timing statistics for Kenai River chinook salmon as estimated from gill net tagging fishery, sonar, and sport harvest data.

return-to-date. Second, sport harvest-to-date for the guided and unguided fisheries will be estimated from creel survey data. The historical cumulative distributions (Appendix B9, B10, C9 and C10) will be used to estimate the cumulative proportion of the harvest in the fishery to date. The total expected inriver return and harvest for that run and year will be projected using equation (4) above. Finally, projected spawning escapement is computed as the difference between projected inriver return and projected sport harvest.

The variability in these data is consistent with other migratory timing data bases for inshore returns of chinook salmon to Alaskan waters (McBride et al. 1984, Mundy et al. 1985). While all of these parameters will be projected for the total run on a daily basis, the precision of the estimates should be sufficient to detect significant deviations from recent historical performance by the mean date of each run (Table 3).

Several areas of uncertainty still exist for the 1989 season. First, the effect of the bait restriction on the early run sport fishery is unknown. A similar bait restriction on the Naknek River in Bristol Bay (Minard 1988) resulted in nearly a 50% reduction in sport harvest for returns of nearly equal size. However, no significant alterations were observed in timing of the fishery in relation to chinook salmon run timing. Secondly, it is impossible to quantify at this time the effect of alterations in the fishery that are less than total closures (i.e. time/area restrictions, gear restrictions, etc.). Third, we will attempt to improve the precision of the tagging estimates, particularly during the late July period. Alexandersdottir and Carlon (in press) suggest that this can be accomplished through increased tagging and/or tag recovery. Planned alterations in the tagging gill net fishery will not compromise the migratory time density database or analysis. And fourth, we have not yet quantified the mortality rate of released fish in the sport fishery. A program will be initiated during 1989 to answer this question.

Several cross-checks are incorporated into our assessment of run timing and strength. As explained previously, inriver abundance is estimated by two independent means, sonar and tagging. Inriver migratory timing for the early run is also assessed by two independent means, inriver tagging fishery and sport unguided CPUE. As we accumulate additional years of information, sonar data will also provide an independent estimate of inriver migratory timing. Finally, total return of late run fish to upper Cook Inlet is projected from commercial harvest data from the east-side set gill net fishery.

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APPENDIX A

Kenai River Chinook Salmon Management Plans

APPENDIX A1. KENAI RIVER EARLY KING SALMON MANAGEMENT PLAN.

(a) The purpose of this management plan is to ensure an adequate escapement of early-run salmon into the Kenai River system and to provide management guidelines to the department.

(b) The department shall manage the early-run Kenai River king salmon to achieve a minimum spawning escapement level of 5,300 salmon and an optimum spawning escapement level of 9,000 salmon as follows:

(1) from January 1 until an optimum spawning escapement level of 9,000 can be projected, only artificial lures may be used in the Kenai River; if the early run spawning escapement is projected to exceed 9,000 king salmon, the department shall establish a period by emergency order during which bait may be used in the Kenai River downstream from Skilak Lake;

(2) if the projected escapement level is between 5,300 and 9,000 king salmon, the department shall restrict the taking of king salmon in the Kenai River recreational fishery as necessary to achieve the optimum escapement; the department shall establish periods by emergency order during which

(A) time and/or area are reduced; or

(B) bag and possession limits are zero and methods are limited to artificial lures with not more than one single hook;

(3) if the spawning escapement level is projected to be less than 5,300, the department shall close the recreational fishery in the Kenai River to the taking of king salmon as follows:

(A) downstream from a department marker located near the confluence of the Funny River until July 1; and

(B) upstream from a department marker located near the confluence of the Funny River until July 10.

APPENDIX A2. KENAI RIVER LATE KING SALMON MANAGEMENT PLAN.

(a) The purpose of this management plan is to ensure an adequate escapement of late run king salmon into the Kenai River system and to provide management guidelines to the department.

(b) The department shall manage the late run Kenai River king salmon to achieve a minimum spawning escapement level of 15,500 salmon and an optimum spawning escapement level of 22,300 salmon as follows:

(1) if the projected spawning escapement level is less than 15,500 king salmon, the department shall:

(A) close the recreational fisheries in the Kenai River and in the salt waters of Cook Inlet north of the latitude of Bluff Point to the taking of king salmon;

(B) close the drift gill net fishery in the Central District within 3 miles of the Kenai Peninsula shoreline; and

(C) close the set gill net fishery in the Upper Subdistrict of the Central District;

(2) if the projected spawning escapement level is between 15,500 and 22,300 king salmon, the department shall restrict the taking of king salmon in the Kenai River recreational fisheries as necessary to achieve the optimum escapement; the department shall establish periods by emergency order during which

(A) time or area is reduced;

(B) bag and possession limits are zero; or

(C) only artificial lures may be used.

APPENDIX B

Historic Migratory Timing Data for the Early Run of Kenai River Chinook Salmon

Appendix Table B1. Cumulative proportions of catch/crew for the gill net tagging fishery from the early run, 1985-1988.

Coded Dates	Dates	Cumulative Proportions [P_t] by Year						90% CI		
		1985	1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	16-May	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0%
2	17-May	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.0%
3	18-May	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.0%
4	19-May	0.000	0.007	0.000	0.000	0.004	0.000	0.000	0.000	0.0%
5	20-May	0.000	0.009	0.005	0.025	0.013	0.011	0.000	0.027	107.2%
6	21-May	0.009	0.011	0.015	0.052	0.022	0.041	0.000	0.046	107.4%
7	22-May	0.019	0.013	0.027	0.073	0.033	0.074	0.000	0.065	96.5%
8	23-May	0.036	0.023	0.038	0.079	0.044	0.058	0.016	0.072	63.9%
9	24-May	0.047	0.041	0.044	0.089	0.055	0.051	0.029	0.082	47.7%
10	25-May	0.067	0.056	0.044	0.101	0.067	0.059	0.039	0.096	42.6%
11	26-May	0.086	0.068	0.056	0.106	0.079	0.048	0.053	0.105	32.5%
12	27-May	0.104	0.079	0.072	0.120	0.094	0.050	0.068	0.120	28.0%
13	28-May	0.124	0.089	0.090	0.148	0.113	0.082	0.079	0.146	29.9%
14	29-May	0.136	0.116	0.132	0.182	0.141	0.081	0.108	0.175	23.7%
15	30-May	0.153	0.125	0.159	0.182	0.155	0.055	0.127	0.182	17.8%
16	31-May	0.159	0.142	0.213	0.204	0.180	0.119	0.139	0.220	22.5%
17	01-Jun	0.167	0.155	0.242	0.220	0.196	0.173	0.147	0.245	25.0%
18	02-Jun	0.178	0.173	0.265	0.255	0.218	0.240	0.160	0.275	26.4%
19	03-Jun	0.201	0.178	0.298	0.289	0.242	0.373	0.170	0.313	29.7%
20	04-Jun	0.237	0.205	0.335	0.353	0.282	0.527	0.197	0.368	30.2%
21	05-Jun	0.274	0.227	0.371	0.393	0.316	0.621	0.224	0.409	29.3%
22	06-Jun	0.318	0.267	0.427	0.411	0.356	0.583	0.266	0.445	25.2%
23	07-Jun	0.359	0.314	0.461	0.430	0.391	0.444	0.313	0.470	20.0%
24	08-Jun	0.402	0.349	0.487	0.450	0.422	0.358	0.352	0.493	16.6%
25	09-Jun	0.444	0.382	0.507	0.472	0.451	0.278	0.389	0.513	13.7%
26	10-Jun	0.481	0.434	0.521	0.491	0.482	0.130	0.439	0.524	8.8%
27	11-Jun	0.513	0.490	0.536	0.505	0.511	0.036	0.488	0.533	4.4%
28	12-Jun	0.552	0.545	0.558	0.513	0.542	0.041	0.518	0.566	4.4%
29	13-Jun	0.591	0.594	0.596	0.530	0.578	0.102	0.540	0.615	6.5%
30	14-Jun	0.611	0.629	0.631	0.559	0.607	0.113	0.568	0.647	6.5%
31	15-Jun	0.633	0.656	0.660	0.593	0.635	0.097	0.599	0.672	5.8%
32	16-Jun	0.666	0.682	0.690	0.654	0.673	0.026	0.654	0.692	2.8%
33	17-Jun	0.694	0.703	0.714	0.707	0.704	0.007	0.694	0.715	1.4%
34	18-Jun	0.716	0.717	0.728	0.731	0.723	0.006	0.714	0.732	1.3%
35	19-Jun	0.744	0.735	0.736	0.769	0.746	0.025	0.728	0.765	2.5%
36	20-Jun	0.764	0.745	0.758	0.792	0.765	0.039	0.741	0.788	3.1%
37	21-Jun	0.786	0.759	0.778	0.814	0.784	0.053	0.757	0.811	3.5%
38	22-Jun	0.811	0.775	0.791	0.835	0.803	0.068	0.773	0.834	3.8%
39	23-Jun	0.839	0.798	0.809	0.849	0.824	0.060	0.795	0.852	3.5%
40	24-Jun	0.857	0.818	0.833	0.869	0.844	0.054	0.817	0.872	3.2%
41	25-Jun	0.872	0.852	0.859	0.889	0.868	0.026	0.849	0.887	2.2%
42	26-Jun	0.887	0.881	0.898	0.913	0.895	0.020	0.878	0.911	1.8%
43	27-Jun	0.899	0.921	0.925	0.932	0.919	0.021	0.902	0.936	1.8%
44	28-Jun	0.924	0.963	0.952	0.963	0.950	0.034	0.928	0.972	2.3%
45	29-Jun	0.962	0.983	0.973	0.978	0.974	0.008	0.964	0.985	1.1%
46	30-Jun	1.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] $\alpha = 0.10$

Appendix Table B2. Cumulative proportions for sonar counts of early run chinook salmon, Kenai River, 1988.

Coded Dates	Dates	[Pt] 1988	Coded Dates	Dates	[Pt] 1988
1	16-May	0.009	24	08-Jun	0.507
2	17-May	0.029	25	09-Jun	0.534
3	18-May	0.041	26	10-Jun	0.550
4	19-May	0.054	27	11-Jun	0.565
5	20-May	0.073	28	12-Jun	0.580
6	21-May	0.082	29	13-Jun	0.589
7	22-May	0.091	30	14-Jun	0.603
8	23-May	0.102	31	15-Jun	0.627
9	24-May	0.116	32	16-Jun	0.666
10	25-May	0.132	33	17-Jun	0.691
11	26-May	0.151	34	18-Jun	0.717
12	27-May	0.170	35	19-Jun	0.726
13	28-May	0.193	36	20-Jun	0.735
14	29-May	0.227	37	21-Jun	0.723
15	30-May	0.243	38	22-Jun	0.768
16	31-May	0.267	39	23-Jun	0.786
17	01-Jun	0.294	40	24-Jun	0.818
18	02-Jun	0.312	41	25-Jun	0.846
19	03-Jun	0.348	42	26-Jun	0.867
20	04-Jun	0.345	43	27-Jun	0.893
21	05-Jun	0.422	44	28-Jun	0.933
22	06-Jun	0.446	45	29-Jun	0.956
23	07-Jun	0.470	46	30-Jun	1.000

Appendix Table B3. Cumulative proportions for guided sport effort from the early run, 1986-1988.

Coded Dates	Dates	Cumulative proportions [P_t] by Year					90% CI		Rel Pre[1]
		1986	1987	1988	Mean	Variance	Low	High	
1	16-May	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0%
2	17-May	0.000	0.011	0.008	0.007	0.000	0.000	0.015	121.8%
3	18-May	0.000	0.011	0.017	0.009	0.000	0.000	0.021	123.5%
4	19-May	0.000	0.019	0.026	0.015	0.000	0.000	0.033	121.1%
5	20-May	0.000	0.026	0.033	0.020	0.000	0.000	0.043	120.5%
6	21-May	0.000	0.032	0.066	0.032	0.001	0.000	0.077	136.8%
7	22-May	0.031	0.038	0.092	0.054	0.001	0.009	0.099	83.9%
8	23-May	0.043	0.064	0.092	0.067	0.001	0.033	0.100	50.1%
9	24-May	0.054	0.080	0.113	0.082	0.001	0.042	0.123	49.1%
10	25-May	0.067	0.089	0.127	0.094	0.001	0.053	0.135	43.3%
11	26-May	0.081	0.105	0.137	0.108	0.001	0.070	0.146	35.1%
12	27-May	0.095	0.118	0.158	0.124	0.001	0.081	0.167	34.8%
13	28-May	0.109	0.120	0.165	0.131	0.001	0.091	0.171	30.6%
14	29-May	0.118	0.130	0.192	0.147	0.002	0.092	0.201	36.9%
15	30-May	0.129	0.194	0.202	0.175	0.002	0.120	0.230	31.2%
16	31-May	0.163	0.231	0.223	0.205	0.001	0.155	0.256	24.6%
17	01-Jun	0.175	0.231	0.240	0.215	0.001	0.168	0.263	22.1%
18	02-Jun	0.175	0.246	0.271	0.230	0.002	0.163	0.298	29.1%
19	03-Jun	0.187	0.275	0.295	0.252	0.003	0.174	0.331	30.9%
20	04-Jun	0.199	0.293	0.337	0.276	0.005	0.181	0.372	34.6%
21	05-Jun	0.220	0.321	0.366	0.302	0.006	0.201	0.404	33.5%
22	06-Jun	0.267	0.349	0.366	0.327	0.003	0.255	0.399	22.0%
23	07-Jun	0.347	0.368	0.398	0.371	0.001	0.337	0.405	9.2%
24	08-Jun	0.379	0.368	0.432	0.393	0.001	0.347	0.439	11.8%
25	09-Jun	0.379	0.420	0.467	0.422	0.002	0.362	0.482	14.2%
26	10-Jun	0.426	0.458	0.500	0.461	0.001	0.411	0.512	10.9%
27	11-Jun	0.460	0.494	0.537	0.497	0.001	0.445	0.549	10.5%
28	12-Jun	0.478	0.529	0.548	0.518	0.001	0.470	0.567	9.4%
29	13-Jun	0.536	0.562	0.548	0.549	0.000	0.531	0.567	3.3%
30	14-Jun	0.577	0.594	0.585	0.585	0.000	0.574	0.597	1.9%
31	15-Jun	0.610	0.594	0.614	0.606	0.000	0.591	0.621	2.4%
32	16-Jun	0.610	0.623	0.654	0.629	0.000	0.599	0.659	4.8%
33	17-Jun	0.652	0.671	0.675	0.666	0.000	0.649	0.682	2.5%
34	18-Jun	0.688	0.703	0.711	0.701	0.000	0.685	0.717	2.2%
35	19-Jun	0.728	0.740	0.739	0.736	0.000	0.726	0.745	1.3%
36	20-Jun	0.767	0.775	0.739	0.760	0.000	0.735	0.785	3.3%
37	21-Jun	0.798	0.804	0.772	0.791	0.000	0.769	0.814	2.9%
38	22-Jun	0.813	0.804	0.808	0.808	0.000	0.803	0.814	0.7%
39	23-Jun	0.813	0.841	0.826	0.827	0.000	0.808	0.845	2.3%
40	24-Jun	0.835	0.866	0.858	0.853	0.000	0.831	0.875	2.6%
41	25-Jun	0.874	0.900	0.888	0.887	0.000	0.869	0.905	2.0%
42	26-Jun	0.902	0.922	0.912	0.912	0.000	0.898	0.925	1.5%
43	27-Jun	0.932	0.957	0.912	0.934	0.001	0.903	0.965	3.3%
44	28-Jun	0.976	0.983	0.941	0.967	0.000	0.937	0.997	3.1%
45	29-Jun	1.000	0.983	0.971	0.985	0.000	0.965	1.000	2.0%
46	30-Jun	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] $\alpha = 0.10$

Appendix Table B4. Cumulative proportions for unguided sport effort from the early run, 1986-1988.

Coded Dates	Dates	Cumulative proportions [P_t] by Year					90% CI		
		1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	16-May	0.000	0.005	0.000	0.002	0.000	0.000	0.006	235.0%
2	17-May	0.005	0.011	0.005	0.007	0.000	0.002	0.012	74.2%
3	18-May	0.010	0.011	0.009	0.010	0.000	0.009	0.012	15.5%
4	19-May	0.010	0.016	0.014	0.013	0.000	0.009	0.017	29.6%
5	20-May	0.015	0.019	0.027	0.020	0.000	0.013	0.028	38.6%
6	21-May	0.020	0.024	0.064	0.036	0.001	0.003	0.069	90.5%
7	22-May	0.023	0.029	0.089	0.047	0.001	0.000	0.097	105.1%
8	23-May	0.027	0.055	0.089	0.057	0.001	0.015	0.099	73.2%
9	24-May	0.042	0.080	0.100	0.074	0.001	0.034	0.114	53.8%
10	25-May	0.072	0.087	0.108	0.089	0.000	0.064	0.113	27.5%
11	26-May	0.083	0.095	0.115	0.097	0.000	0.076	0.119	22.1%
12	27-May	0.084	0.101	0.130	0.105	0.001	0.074	0.137	30.0%
13	28-May	0.085	0.109	0.150	0.115	0.001	0.070	0.159	38.8%
14	29-May	0.089	0.118	0.207	0.138	0.004	0.054	0.222	60.8%
15	30-May	0.094	0.180	0.222	0.165	0.004	0.077	0.254	53.4%
16	31-May	0.110	0.218	0.247	0.192	0.005	0.094	0.290	51.2%
17	01-Jun	0.121	0.218	0.267	0.202	0.006	0.101	0.303	50.1%
18	02-Jun	0.121	0.238	0.304	0.221	0.009	0.095	0.347	57.0%
19	03-Jun	0.129	0.259	0.329	0.239	0.010	0.101	0.377	57.6%
20	04-Jun	0.140	0.279	0.416	0.278	0.019	0.091	0.465	67.2%
21	05-Jun	0.157	0.310	0.433	0.300	0.019	0.113	0.488	62.4%
22	06-Jun	0.177	0.396	0.433	0.335	0.019	0.147	0.523	56.0%
23	07-Jun	0.267	0.438	0.466	0.390	0.012	0.244	0.536	37.4%
24	08-Jun	0.325	0.438	0.486	0.416	0.007	0.304	0.528	26.9%
25	09-Jun	0.325	0.474	0.496	0.431	0.009	0.305	0.557	29.2%
26	10-Jun	0.358	0.502	0.509	0.456	0.007	0.341	0.572	25.3%
27	11-Jun	0.386	0.530	0.569	0.495	0.009	0.364	0.626	26.5%
28	12-Jun	0.415	0.564	0.593	0.524	0.009	0.394	0.654	24.8%
29	13-Jun	0.487	0.630	0.593	0.570	0.006	0.469	0.671	17.7%
30	14-Jun	0.566	0.658	0.625	0.616	0.002	0.553	0.680	10.3%
31	15-Jun	0.640	0.658	0.648	0.649	0.000	0.636	0.661	1.9%
32	16-Jun	0.640	0.674	0.678	0.664	0.000	0.636	0.693	4.3%
33	17-Jun	0.677	0.702	0.707	0.695	0.000	0.673	0.717	3.2%
34	18-Jun	0.699	0.726	0.741	0.722	0.000	0.693	0.751	4.0%
35	19-Jun	0.720	0.749	0.763	0.744	0.000	0.714	0.774	4.0%
36	20-Jun	0.746	0.798	0.763	0.769	0.001	0.733	0.805	4.6%
37	21-Jun	0.791	0.834	0.790	0.805	0.001	0.771	0.839	4.2%
38	22-Jun	0.815	0.834	0.812	0.820	0.000	0.804	0.836	2.0%
39	23-Jun	0.815	0.847	0.832	0.831	0.000	0.809	0.853	2.6%
40	24-Jun	0.833	0.864	0.849	0.849	0.000	0.828	0.870	2.5%
41	25-Jun	0.858	0.888	0.898	0.881	0.000	0.853	0.910	3.2%
42	26-Jun	0.888	0.920	0.931	0.913	0.000	0.883	0.944	3.3%
43	27-Jun	0.913	0.943	0.931	0.929	0.000	0.909	0.949	2.2%
44	28-Jun	0.960	0.980	0.959	0.967	0.000	0.951	0.983	1.7%
45	29-Jun	1.000	0.980	0.984	0.988	0.000	0.974	1.000	1.4%
46	30-Jun	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] $\alpha = 0.10$

Appendix Table B5. Cumulative proportions for guided sport HPUE from the early run, 1986-1988.

Coded Dates	Dates	Cumulative proportions [P_t] by Year					90% CI		
		1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	16-May	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0%
2	17-May	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0%
3	18-May	0.000	0.000	0.022	0.007	0.000	0.000	0.025	235.0%
4	19-May	0.000	0.000	0.045	0.015	0.001	0.000	0.050	235.0%
5	20-May	0.042	0.000	0.075	0.039	0.001	0.000	0.090	130.2%
6	21-May	0.042	0.014	0.075	0.044	0.001	0.000	0.085	93.6%
7	22-May	0.051	0.014	0.115	0.060	0.003	0.009	0.129	115.3%
8	23-May	0.063	0.024	0.115	0.067	0.002	0.033	0.129	91.6%
9	24-May	0.078	0.041	0.148	0.089	0.003	0.042	0.163	82.5%
10	25-May	0.093	0.061	0.191	0.115	0.005	0.053	0.207	80.1%
11	26-May	0.099	0.092	0.216	0.136	0.005	0.070	0.230	69.4%
12	27-May	0.145	0.092	0.255	0.164	0.007	0.081	0.277	68.6%
13	28-May	0.157	0.121	0.294	0.191	0.008	0.091	0.314	64.7%
14	29-May	0.188	0.157	0.312	0.219	0.007	0.092	0.330	50.8%
15	30-May	0.214	0.185	0.312	0.237	0.004	0.120	0.327	38.1%
16	31-May	0.226	0.226	0.312	0.255	0.002	0.155	0.322	26.3%
17	01-Jun	0.316	0.226	0.384	0.309	0.006	0.168	0.416	34.8%
18	02-Jun	0.316	0.276	0.412	0.335	0.005	0.163	0.430	28.4%
19	03-Jun	0.316	0.362	0.430	0.369	0.003	0.174	0.447	21.1%
20	04-Jun	0.316	0.414	0.453	0.395	0.005	0.181	0.491	24.4%
21	05-Jun	0.382	0.488	0.477	0.449	0.003	0.201	0.528	17.6%
22	06-Jun	0.412	0.514	0.477	0.468	0.003	0.255	0.538	15.0%
23	07-Jun	0.438	0.551	0.484	0.491	0.003	0.337	0.568	15.7%
24	08-Jun	0.476	0.551	0.497	0.508	0.002	0.347	0.561	10.4%
25	09-Jun	0.476	0.570	0.518	0.521	0.002	0.362	0.586	12.4%
26	10-Jun	0.504	0.606	0.539	0.550	0.003	0.411	0.620	12.8%
27	11-Jun	0.553	0.639	0.559	0.584	0.002	0.445	0.649	11.1%
28	12-Jun	0.578	0.649	0.588	0.605	0.001	0.470	0.657	8.6%
29	13-Jun	0.607	0.669	0.588	0.621	0.002	0.531	0.678	9.3%
30	14-Jun	0.631	0.697	0.629	0.652	0.001	0.574	0.705	8.0%
31	15-Jun	0.661	0.697	0.663	0.674	0.000	0.591	0.701	4.0%
32	16-Jun	0.661	0.739	0.693	0.698	0.002	0.599	0.751	7.6%
33	17-Jun	0.677	0.785	0.728	0.730	0.003	0.649	0.803	10.0%
34	18-Jun	0.690	0.808	0.752	0.750	0.003	0.685	0.830	10.6%
35	19-Jun	0.718	0.836	0.785	0.779	0.003	0.726	0.859	10.3%
36	20-Jun	0.754	0.855	0.785	0.798	0.003	0.735	0.866	8.8%
37	21-Jun	0.768	0.860	0.818	0.816	0.002	0.769	0.878	7.7%
38	22-Jun	0.822	0.860	0.837	0.840	0.000	0.803	0.866	3.1%
39	23-Jun	0.822	0.867	0.862	0.851	0.001	0.808	0.884	3.9%
40	24-Jun	0.844	0.881	0.875	0.867	0.000	0.831	0.894	3.2%
41	25-Jun	0.872	0.910	0.888	0.890	0.000	0.869	0.916	2.9%
42	26-Jun	0.899	0.952	0.903	0.918	0.001	0.898	0.958	4.4%
43	27-Jun	0.935	0.969	0.903	0.935	0.001	0.903	0.980	4.8%
44	28-Jun	0.980	0.997	0.944	0.974	0.001	0.937	1.000	3.8%
45	29-Jun	1.000	0.997	0.977	0.991	0.000	0.965	1.000	1.7%
46	30-Jun	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] $\alpha = 0.10$

Appendix Table B6. Cumulative proportions for unguided sport HPUE from the early run, 1986-1988.

Coded Dates	Dates	Cumulative proportions [P_t] by Year					90% CI		
		1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	16-May	0.000	0.135	0.000	0.045	0.006	0.000	0.151	235.0%
2	17-May	0.000	0.135	0.000	0.045	0.006	0.002	0.151	235.0%
3	18-May	0.006	0.135	0.011	0.051	0.005	0.009	0.150	196.4%
4	19-May	0.006	0.145	0.098	0.083	0.005	0.009	0.178	115.6%
5	20-May	0.006	0.169	0.183	0.119	0.010	0.013	0.252	111.9%
6	21-May	0.006	0.186	0.212	0.134	0.013	0.003	0.286	113.1%
7	22-May	0.047	0.186	0.223	0.152	0.009	0.000	0.278	83.1%
8	23-May	0.051	0.197	0.223	0.157	0.009	0.015	0.283	80.4%
9	24-May	0.061	0.206	0.252	0.173	0.010	0.034	0.308	78.5%
10	25-May	0.072	0.212	0.252	0.179	0.009	0.064	0.307	71.6%
11	26-May	0.072	0.217	0.271	0.187	0.011	0.076	0.327	74.6%
12	27-May	0.072	0.217	0.285	0.192	0.012	0.074	0.339	76.9%
13	28-May	0.130	0.217	0.308	0.219	0.008	0.070	0.340	55.4%
14	29-May	0.130	0.259	0.320	0.236	0.009	0.054	0.368	55.7%
15	30-May	0.142	0.283	0.335	0.253	0.010	0.077	0.389	53.5%
16	31-May	0.145	0.313	0.353	0.270	0.012	0.094	0.420	55.5%
17	01-Jun	0.159	0.313	0.441	0.304	0.020	0.101	0.496	63.0%
18	02-Jun	0.159	0.388	0.464	0.337	0.025	0.095	0.553	64.0%
19	03-Jun	0.159	0.416	0.477	0.350	0.028	0.101	0.579	65.3%
20	04-Jun	0.159	0.453	0.490	0.367	0.033	0.091	0.613	67.1%
21	05-Jun	0.204	0.481	0.508	0.398	0.028	0.113	0.626	57.3%
22	06-Jun	0.246	0.492	0.508	0.415	0.022	0.147	0.615	48.0%
23	07-Jun	0.288	0.509	0.511	0.436	0.016	0.244	0.610	39.9%
24	08-Jun	0.326	0.509	0.536	0.457	0.013	0.304	0.611	33.8%
25	09-Jun	0.326	0.522	0.567	0.472	0.016	0.305	0.645	36.8%
26	10-Jun	0.371	0.550	0.590	0.504	0.014	0.341	0.662	31.4%
27	11-Jun	0.417	0.652	0.602	0.557	0.015	0.364	0.725	30.2%
28	12-Jun	0.468	0.662	0.617	0.582	0.010	0.394	0.720	23.6%
29	13-Jun	0.510	0.671	0.617	0.599	0.007	0.469	0.711	18.6%
30	14-Jun	0.535	0.695	0.643	0.624	0.007	0.553	0.735	17.7%
31	15-Jun	0.576	0.695	0.681	0.651	0.004	0.636	0.738	13.5%
32	16-Jun	0.576	0.743	0.705	0.675	0.008	0.636	0.794	17.6%
33	17-Jun	0.587	0.763	0.749	0.700	0.010	0.673	0.832	18.9%
34	18-Jun	0.594	0.781	0.761	0.712	0.011	0.693	0.851	19.5%
35	19-Jun	0.642	0.869	0.791	0.767	0.013	0.714	0.924	20.4%
36	20-Jun	0.694	0.887	0.791	0.791	0.009	0.733	0.922	16.6%
37	21-Jun	0.709	0.916	0.815	0.814	0.011	0.771	0.954	17.3%
38	22-Jun	0.746	0.916	0.832	0.832	0.007	0.804	0.947	13.9%
39	23-Jun	0.746	0.924	0.845	0.839	0.008	0.809	0.960	14.5%
40	24-Jun	0.804	0.941	0.877	0.874	0.005	0.828	0.967	10.7%
41	25-Jun	0.846	0.958	0.890	0.898	0.003	0.853	0.975	8.5%
42	26-Jun	0.878	0.972	0.905	0.918	0.002	0.883	0.984	7.1%
43	27-Jun	0.965	0.986	0.905	0.952	0.002	0.909	1.000	6.0%
44	28-Jun	0.993	1.000	0.953	0.982	0.001	0.951	1.000	3.5%
45	29-Jun	1.000	1.000	0.977	0.992	0.000	0.974	1.000	1.8%
46	30-Jun	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] $\alpha = 0.10$

Appendix Table B7. Cumulative proportions for guided sport CPUE from the early run, 1986-1988.

Coded Dates	Dates	Cumulative proportions [P_t] by Year			Mean	Variance	90% CI		Rel Pre[1]
		1986	1987	1988			Low	High	
1	16-May	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0%
2	17-May	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0%
3	18-May	0.000	0.000	0.016	0.005	0.000	0.000	0.017	235.0%
4	19-May	0.000	0.000	0.032	0.011	0.000	0.000	0.035	235.0%
5	20-May	0.028	0.000	0.052	0.027	0.001	0.000	0.063	132.3%
6	21-May	0.028	0.016	0.052	0.032	0.000	0.000	0.058	79.2%
7	22-May	0.037	0.016	0.088	0.047	0.001	0.009	0.097	108.3%
8	23-May	0.048	0.024	0.088	0.053	0.001	0.033	0.097	82.3%
9	24-May	0.061	0.037	0.119	0.072	0.002	0.042	0.129	79.3%
10	25-May	0.075	0.051	0.166	0.097	0.004	0.053	0.179	84.7%
11	26-May	0.079	0.088	0.192	0.119	0.004	0.070	0.204	71.2%
12	27-May	0.109	0.088	0.230	0.142	0.006	0.081	0.246	72.9%
13	28-May	0.126	0.123	0.264	0.171	0.006	0.091	0.280	63.7%
14	29-May	0.151	0.156	0.280	0.196	0.005	0.092	0.295	50.6%
15	30-May	0.171	0.180	0.280	0.210	0.004	0.120	0.292	39.1%
16	31-May	0.185	0.214	0.323	0.241	0.005	0.155	0.339	40.7%
17	01-Jun	0.265	0.214	0.386	0.289	0.008	0.168	0.409	41.5%
18	02-Jun	0.265	0.278	0.420	0.321	0.007	0.163	0.437	36.1%
19	03-Jun	0.265	0.350	0.434	0.350	0.007	0.174	0.465	32.7%
20	04-Jun	0.265	0.407	0.461	0.378	0.010	0.181	0.515	36.3%
21	05-Jun	0.347	0.467	0.486	0.433	0.006	0.201	0.536	23.7%
22	06-Jun	0.382	0.497	0.486	0.455	0.004	0.255	0.542	19.0%
23	07-Jun	0.407	0.534	0.493	0.478	0.004	0.337	0.566	18.4%
24	08-Jun	0.443	0.534	0.508	0.495	0.002	0.347	0.558	12.8%
25	09-Jun	0.443	0.553	0.531	0.509	0.003	0.362	0.588	15.5%
26	10-Jun	0.469	0.590	0.553	0.538	0.004	0.411	0.622	15.7%
27	11-Jun	0.525	0.622	0.580	0.576	0.002	0.445	0.642	11.4%
28	12-Jun	0.557	0.633	0.600	0.597	0.001	0.470	0.649	8.7%
29	13-Jun	0.593	0.653	0.600	0.615	0.001	0.531	0.660	7.2%
30	14-Jun	0.615	0.679	0.635	0.643	0.001	0.574	0.688	7.0%
31	15-Jun	0.641	0.679	0.664	0.662	0.000	0.591	0.688	3.9%
32	16-Jun	0.641	0.720	0.695	0.686	0.002	0.599	0.740	8.0%
33	17-Jun	0.652	0.769	0.732	0.718	0.004	0.649	0.799	11.3%
34	18-Jun	0.667	0.803	0.760	0.743	0.005	0.685	0.838	12.7%
35	19-Jun	0.692	0.846	0.793	0.777	0.006	0.726	0.883	13.6%
36	20-Jun	0.722	0.867	0.793	0.794	0.005	0.735	0.892	12.4%
37	21-Jun	0.736	0.875	0.823	0.812	0.005	0.769	0.907	11.8%
38	22-Jun	0.781	0.875	0.841	0.833	0.002	0.803	0.897	7.8%
39	23-Jun	0.781	0.882	0.859	0.841	0.003	0.808	0.913	8.5%
40	24-Jun	0.809	0.897	0.880	0.862	0.002	0.831	0.926	7.4%
41	25-Jun	0.848	0.921	0.893	0.887	0.001	0.869	0.937	5.6%
42	26-Jun	0.872	0.957	0.908	0.912	0.002	0.898	0.971	6.4%
43	27-Jun	0.939	0.972	0.908	0.939	0.001	0.903	0.983	4.6%
44	28-Jun	0.981	0.998	0.946	0.975	0.001	0.937	1.000	3.7%
45	29-Jun	1.000	0.998	0.976	0.992	0.000	0.965	1.000	1.8%
46	30-Jun	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] $\alpha = 0.10$

Appendix Table B8. Cumulative proportions for unguided sport CPUE from the early run, 1986-1988.

Coded Dates	Dates	Cumulative proportions [P_t] by Year			Mean	Variance	90% CI		Rel Pre[1]
		1986	1987	1988			Low	High	
1	16-May	0.000	0.100	0.000	0.033	0.003	0.000	0.111	235.0%
2	17-May	0.000	0.104	0.000	0.035	0.004	0.002	0.116	235.0%
3	18-May	0.007	0.104	0.015	0.042	0.003	0.009	0.115	173.1%
4	19-May	0.007	0.111	0.074	0.064	0.003	0.009	0.135	111.0%
5	20-May	0.007	0.181	0.131	0.107	0.008	0.013	0.228	113.8%
6	21-May	0.007	0.194	0.171	0.124	0.010	0.003	0.262	111.2%
7	22-May	0.033	0.194	0.179	0.135	0.008	0.000	0.256	89.4%
8	23-May	0.035	0.206	0.179	0.140	0.008	0.015	0.265	88.9%
9	24-May	0.048	0.212	0.233	0.164	0.010	0.034	0.302	83.6%
10	25-May	0.066	0.225	0.233	0.175	0.009	0.064	0.303	73.2%
11	26-May	0.066	0.248	0.252	0.189	0.011	0.076	0.333	76.5%
12	27-May	0.066	0.248	0.261	0.192	0.012	0.074	0.340	77.3%
13	28-May	0.120	0.248	0.280	0.216	0.007	0.070	0.331	53.4%
14	29-May	0.126	0.310	0.290	0.242	0.010	0.054	0.379	56.5%
15	30-May	0.134	0.334	0.304	0.257	0.012	0.077	0.404	57.0%
16	31-May	0.137	0.366	0.316	0.273	0.014	0.094	0.436	59.7%
17	01-Jun	0.150	0.366	0.382	0.299	0.017	0.101	0.475	58.6%
18	02-Jun	0.150	0.440	0.413	0.334	0.026	0.095	0.552	64.9%
19	03-Jun	0.150	0.468	0.427	0.348	0.030	0.101	0.583	67.3%
20	04-Jun	0.150	0.512	0.438	0.367	0.037	0.091	0.626	70.7%
21	05-Jun	0.188	0.532	0.456	0.392	0.033	0.113	0.637	62.6%
22	06-Jun	0.247	0.542	0.456	0.415	0.023	0.147	0.621	49.6%
23	07-Jun	0.285	0.556	0.458	0.433	0.019	0.244	0.619	43.0%
24	08-Jun	0.320	0.556	0.477	0.451	0.014	0.304	0.613	36.0%
25	09-Jun	0.320	0.568	0.508	0.466	0.017	0.305	0.641	37.6%
26	10-Jun	0.418	0.601	0.528	0.515	0.008	0.341	0.640	24.3%
27	11-Jun	0.466	0.676	0.542	0.561	0.011	0.364	0.705	25.6%
28	12-Jun	0.521	0.686	0.554	0.587	0.008	0.394	0.705	20.2%
29	13-Jun	0.558	0.695	0.554	0.602	0.006	0.469	0.711	18.1%
30	14-Jun	0.585	0.718	0.587	0.630	0.006	0.553	0.733	16.4%
31	15-Jun	0.617	0.718	0.622	0.652	0.003	0.636	0.730	11.8%
32	16-Jun	0.617	0.723	0.655	0.665	0.003	0.636	0.738	10.9%
33	17-Jun	0.624	0.752	0.684	0.687	0.004	0.673	0.774	12.7%
34	18-Jun	0.630	0.769	0.709	0.702	0.005	0.693	0.797	13.5%
35	19-Jun	0.659	0.850	0.742	0.750	0.009	0.714	0.880	17.3%
36	20-Jun	0.692	0.874	0.742	0.769	0.009	0.733	0.897	16.6%
37	21-Jun	0.707	0.900	0.765	0.791	0.010	0.771	0.925	17.0%
38	22-Jun	0.732	0.900	0.777	0.803	0.008	0.804	0.921	14.7%
39	23-Jun	0.732	0.906	0.789	0.809	0.008	0.809	0.930	14.9%
40	24-Jun	0.776	0.918	0.852	0.849	0.005	0.828	0.945	11.3%
41	25-Jun	0.822	0.939	0.866	0.876	0.004	0.853	0.956	9.2%
42	26-Jun	0.843	0.965	0.883	0.897	0.004	0.883	0.981	9.4%
43	27-Jun	0.941	0.985	0.883	0.937	0.003	0.909	1.000	7.4%
44	28-Jun	0.983	1.000	0.940	0.975	0.001	0.951	1.000	4.3%
45	29-Jun	1.000	1.000	0.957	0.986	0.001	0.974	1.000	3.4%
46	30-Jun	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] $\alpha = 0.10$

Appendix Table B9. Cumulative proportions for guided sport harvest from the early run, 1986-1988.

Coded Dates	Dates	Cumulative proportions [P_t] by Year					90% CI		
		1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	16-May	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0%
2	17-May	0.000	0.000	0.000	0.000	0.000	0.000	0.000	a
3	18-May	0.000	0.000	0.008	0.003	0.000	0.000	0.008	235.0%
4	19-May	0.000	0.000	0.016	0.005	0.000	0.000	0.018	235.0%
5	20-May	0.000	0.000	0.025	0.008	0.000	0.000	0.028	235.0%
6	21-May	0.000	0.003	0.025	0.009	0.000	0.000	0.028	196.3%
7	22-May	0.009	0.003	0.069	0.027	0.001	0.009	0.076	181.4%
8	23-May	0.015	0.012	0.069	0.032	0.001	0.033	0.075	135.9%
9	24-May	0.020	0.022	0.097	0.046	0.002	0.042	0.105	127.6%
10	25-May	0.027	0.028	0.121	0.059	0.003	0.053	0.131	124.0%
11	26-May	0.031	0.047	0.131	0.069	0.003	0.070	0.143	105.7%
12	27-May	0.054	0.047	0.164	0.088	0.004	0.081	0.178	101.6%
13	28-May	0.060	0.049	0.175	0.094	0.005	0.091	0.189	100.2%
14	29-May	0.070	0.061	0.195	0.109	0.006	0.092	0.210	93.4%
15	30-May	0.080	0.125	0.195	0.133	0.003	0.120	0.212	59.1%
16	31-May	0.095	0.180	0.195	0.157	0.003	0.155	0.230	46.8%
17	01-Jun	0.135	0.180	0.246	0.187	0.003	0.168	0.262	40.3%
18	02-Jun	0.135	0.206	0.280	0.207	0.005	0.163	0.306	47.6%
19	03-Jun	0.135	0.297	0.298	0.244	0.009	0.174	0.371	52.2%
20	04-Jun	0.135	0.329	0.338	0.268	0.013	0.181	0.423	58.2%
21	05-Jun	0.185	0.403	0.366	0.318	0.014	0.201	0.477	49.8%
22	06-Jun	0.235	0.428	0.366	0.343	0.010	0.255	0.477	39.0%
23	07-Jun	0.312	0.455	0.374	0.380	0.005	0.337	0.477	25.5%
24	08-Jun	0.355	0.455	0.393	0.401	0.003	0.347	0.469	17.0%
25	09-Jun	0.355	0.490	0.423	0.422	0.005	0.362	0.514	21.7%
26	10-Jun	0.404	0.539	0.450	0.464	0.005	0.411	0.558	20.2%
27	11-Jun	0.463	0.580	0.481	0.508	0.004	0.445	0.594	16.8%
28	12-Jun	0.480	0.593	0.494	0.522	0.004	0.470	0.606	16.0%
29	13-Jun	0.539	0.617	0.494	0.550	0.004	0.531	0.634	15.3%
30	14-Jun	0.576	0.648	0.556	0.593	0.002	0.574	0.659	11.1%
31	15-Jun	0.612	0.648	0.596	0.619	0.001	0.591	0.655	5.9%
32	16-Jun	0.612	0.692	0.644	0.649	0.002	0.599	0.704	8.5%
33	17-Jun	0.635	0.770	0.675	0.693	0.005	0.649	0.787	13.6%
34	18-Jun	0.653	0.797	0.709	0.719	0.005	0.685	0.818	13.7%
35	19-Jun	0.692	0.833	0.747	0.757	0.005	0.726	0.854	12.7%
36	20-Jun	0.743	0.857	0.747	0.782	0.004	0.735	0.870	11.2%
37	21-Jun	0.758	0.863	0.792	0.804	0.003	0.769	0.876	9.0%
38	22-Jun	0.788	0.863	0.818	0.823	0.001	0.803	0.874	6.2%
39	23-Jun	0.788	0.872	0.837	0.832	0.002	0.808	0.889	6.8%
40	24-Jun	0.805	0.885	0.853	0.848	0.002	0.831	0.902	6.4%
41	25-Jun	0.845	0.919	0.869	0.878	0.001	0.869	0.929	5.8%
42	26-Jun	0.872	0.951	0.884	0.902	0.002	0.898	0.960	6.4%
43	27-Jun	0.911	0.972	0.884	0.922	0.002	0.903	0.984	6.7%
44	28-Jun	0.982	0.998	0.934	0.971	0.001	0.937	1.000	4.7%
45	29-Jun	1.000	0.998	0.973	0.990	0.000	0.965	1.000	2.1%
46	30-Jun	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] $\alpha = 0.10$

Appendix Table B10. Cumulative proportions for unguided sport harvest from the early run, 1986-1988.

Coded Dates	Dates	Cumulative proportions [P_t] by Year			Mean	Variance	90% CI		Rel Pre[1]
		1986	1987	1988			Low	High	
1	16-May	0.000	0.030	0.000	0.010	0.000	0.000	0.033	235.0%
2	17-May	0.000	0.030	0.000	0.010	0.000	0.002	0.033	235.0%
3	18-May	0.001	0.030	0.002	0.011	0.000	0.009	0.033	200.8%
4	19-May	0.001	0.031	0.020	0.017	0.000	0.009	0.038	119.3%
5	20-May	0.001	0.035	0.070	0.035	0.001	0.013	0.082	133.0%
6	21-May	0.001	0.038	0.119	0.053	0.004	0.003	0.134	155.0%
7	22-May	0.005	0.038	0.132	0.058	0.004	0.000	0.148	153.3%
8	23-May	0.005	0.052	0.132	0.063	0.004	0.015	0.150	138.1%
9	24-May	0.010	0.060	0.146	0.072	0.005	0.034	0.166	130.0%
10	25-May	0.021	0.062	0.146	0.076	0.004	0.064	0.163	113.8%
11	26-May	0.021	0.064	0.152	0.079	0.004	0.076	0.170	115.3%
12	27-May	0.021	0.064	0.162	0.082	0.005	0.074	0.180	119.5%
13	28-May	0.022	0.064	0.183	0.090	0.007	0.070	0.203	126.2%
14	29-May	0.022	0.080	0.213	0.105	0.010	0.054	0.238	126.3%
15	30-May	0.024	0.144	0.223	0.130	0.010	0.077	0.266	104.1%
16	31-May	0.026	0.193	0.244	0.154	0.013	0.094	0.309	100.4%
17	01-Jun	0.031	0.193	0.324	0.182	0.022	0.101	0.382	109.3%
18	02-Jun	0.031	0.256	0.362	0.216	0.029	0.095	0.446	106.3%
19	03-Jun	0.031	0.281	0.376	0.229	0.032	0.101	0.472	105.7%
20	04-Jun	0.031	0.312	0.428	0.257	0.042	0.091	0.534	107.9%
21	05-Jun	0.055	0.349	0.442	0.282	0.041	0.113	0.556	97.3%
22	06-Jun	0.080	0.390	0.442	0.304	0.038	0.147	0.570	87.4%
23	07-Jun	0.196	0.420	0.446	0.354	0.019	0.244	0.541	52.6%
24	08-Jun	0.266	0.420	0.468	0.384	0.011	0.304	0.528	37.3%
25	09-Jun	0.266	0.440	0.482	0.396	0.013	0.305	0.551	39.3%
26	10-Jun	0.312	0.475	0.496	0.428	0.010	0.341	0.564	31.9%
27	11-Jun	0.351	0.596	0.528	0.492	0.016	0.364	0.663	34.9%
28	12-Jun	0.397	0.610	0.544	0.517	0.012	0.394	0.665	28.6%
29	13-Jun	0.491	0.638	0.544	0.558	0.006	0.469	0.659	18.1%
30	14-Jun	0.552	0.665	0.581	0.599	0.003	0.553	0.679	13.3%
31	15-Jun	0.648	0.665	0.621	0.645	0.000	0.636	0.675	4.6%
32	16-Jun	0.648	0.699	0.655	0.667	0.001	0.636	0.705	5.7%
33	17-Jun	0.660	0.722	0.712	0.698	0.001	0.673	0.743	6.5%
34	18-Jun	0.665	0.742	0.731	0.712	0.002	0.693	0.769	7.9%
35	19-Jun	0.696	0.828	0.761	0.762	0.004	0.714	0.851	11.8%
36	20-Jun	0.739	0.867	0.761	0.789	0.005	0.733	0.882	11.8%
37	21-Jun	0.760	0.911	0.789	0.820	0.006	0.771	0.929	13.2%
38	22-Jun	0.787	0.911	0.806	0.835	0.004	0.804	0.925	10.8%
39	23-Jun	0.787	0.915	0.818	0.840	0.005	0.809	0.931	10.8%
40	24-Jun	0.819	0.927	0.843	0.863	0.003	0.828	0.940	8.9%
41	25-Jun	0.853	0.946	0.872	0.890	0.002	0.853	0.957	7.5%
42	26-Jun	0.883	0.964	0.895	0.914	0.002	0.883	0.973	6.5%
43	27-Jun	0.951	0.978	0.895	0.942	0.002	0.909	0.999	6.1%
44	28-Jun	0.991	1.000	0.957	0.983	0.001	0.951	1.000	3.2%
45	29-Jun	1.000	1.000	0.983	0.994	0.000	0.974	1.000	1.3%
46	30-Jun	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] $\alpha = 0.10$

Appendix Table B11. Cumulative proportions for guided sport catch from the early run, 1986-1988.

Coded Dates	Dates	Cumulative proportions [P_t] by Year 1986	1987	1988	Mean	Variance	90% CI Low	High	Rel Pre[1]
1	16-May	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0%
2	17-May	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0%
3	18-May	0.000	0.000	0.005	0.002	0.000	0.000	0.006	235.0%
4	19-May	0.000	0.000	0.011	0.004	0.000	0.000	0.012	235.0%
5	20-May	0.000	0.000	0.017	0.006	0.000	0.000	0.019	235.0%
6	21-May	0.000	0.004	0.017	0.007	0.000	0.000	0.019	178.0%
7	22-May	0.009	0.004	0.055	0.023	0.001	0.009	0.061	170.1%
8	23-May	0.014	0.011	0.055	0.027	0.001	0.033	0.060	124.5%
9	24-May	0.018	0.019	0.080	0.039	0.001	0.042	0.087	123.3%
10	25-May	0.025	0.023	0.105	0.051	0.002	0.053	0.115	124.9%
11	26-May	0.027	0.045	0.116	0.063	0.002	0.070	0.127	102.2%
12	27-May	0.042	0.045	0.148	0.078	0.004	0.081	0.160	104.6%
13	28-May	0.049	0.048	0.157	0.085	0.004	0.091	0.169	99.9%
14	29-May	0.057	0.060	0.174	0.097	0.004	0.092	0.188	93.4%
15	30-May	0.065	0.115	0.174	0.118	0.003	0.120	0.193	63.2%
16	31-May	0.082	0.161	0.209	0.151	0.004	0.155	0.237	57.6%
17	01-Jun	0.117	0.161	0.252	0.177	0.005	0.168	0.270	53.1%
18	02-Jun	0.117	0.199	0.293	0.203	0.008	0.163	0.322	58.9%
19	03-Jun	0.117	0.259	0.307	0.228	0.010	0.174	0.362	59.0%
20	04-Jun	0.117	0.297	0.352	0.255	0.015	0.181	0.422	65.4%
21	05-Jun	0.175	0.357	0.380	0.304	0.013	0.201	0.457	50.1%
22	06-Jun	0.232	0.388	0.380	0.333	0.008	0.255	0.452	35.6%
23	07-Jun	0.302	0.413	0.389	0.368	0.003	0.337	0.447	21.5%
24	08-Jun	0.342	0.413	0.409	0.388	0.002	0.347	0.442	13.9%
25	09-Jun	0.342	0.450	0.442	0.411	0.004	0.362	0.492	19.7%
26	10-Jun	0.384	0.501	0.470	0.452	0.004	0.411	0.534	18.2%
27	11-Jun	0.450	0.541	0.509	0.500	0.002	0.445	0.563	12.5%
28	12-Jun	0.471	0.555	0.518	0.515	0.002	0.470	0.573	11.2%
29	13-Jun	0.543	0.579	0.518	0.547	0.001	0.531	0.588	7.6%
30	14-Jun	0.574	0.609	0.569	0.584	0.000	0.574	0.614	5.1%
31	15-Jun	0.605	0.609	0.603	0.606	0.000	0.591	0.610	0.8%
32	16-Jun	0.605	0.661	0.651	0.639	0.001	0.599	0.680	6.4%
33	17-Jun	0.620	0.745	0.682	0.682	0.004	0.649	0.767	12.4%
34	18-Jun	0.638	0.784	0.722	0.715	0.005	0.685	0.814	13.9%
35	19-Jun	0.673	0.841	0.759	0.758	0.007	0.726	0.871	15.0%
36	20-Jun	0.714	0.868	0.759	0.780	0.006	0.735	0.887	13.7%
37	21-Jun	0.729	0.876	0.799	0.801	0.005	0.769	0.901	12.5%
38	22-Jun	0.753	0.876	0.824	0.818	0.004	0.803	0.902	10.3%
39	23-Jun	0.753	0.885	0.837	0.825	0.004	0.808	0.916	11.0%
40	24-Jun	0.774	0.899	0.863	0.845	0.004	0.831	0.933	10.4%
41	25-Jun	0.827	0.928	0.879	0.878	0.003	0.869	0.946	7.8%
42	26-Jun	0.850	0.956	0.892	0.900	0.003	0.898	0.972	8.0%
43	27-Jun	0.919	0.975	0.892	0.929	0.002	0.903	0.986	6.1%
44	28-Jun	0.984	0.999	0.937	0.973	0.001	0.937	1.000	4.5%
45	29-Jun	1.000	0.999	0.973	0.991	0.000	0.965	1.000	2.1%
46	30-Jun	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] $\alpha = 0.10$

Appendix Table B12. Cumulative proportions for unguided sport catch from the early run, 1986-1988.

Coded Dates	Dates	Cumulative proportions [P_t] by Year					90% CI		
		1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	16-May	0.000	0.023	0.000	0.008	0.000	0.000	0.026	235.0%
2	17-May	0.000	0.024	0.000	0.008	0.000	0.002	0.027	235.0%
3	18-May	0.001	0.024	0.003	0.009	0.000	0.009	0.027	184.1%
4	19-May	0.001	0.025	0.015	0.014	0.000	0.009	0.030	120.0%
5	20-May	0.001	0.036	0.048	0.028	0.001	0.013	0.061	115.8%
6	21-May	0.001	0.039	0.111	0.051	0.003	0.003	0.126	150.2%
7	22-May	0.003	0.039	0.121	0.055	0.004	0.000	0.137	150.0%
8	23-May	0.004	0.053	0.121	0.060	0.003	0.015	0.140	134.4%
9	24-May	0.010	0.060	0.147	0.072	0.005	0.034	0.166	130.4%
10	25-May	0.026	0.064	0.147	0.079	0.004	0.064	0.163	106.0%
11	26-May	0.026	0.072	0.152	0.083	0.004	0.076	0.170	103.9%
12	27-May	0.026	0.072	0.159	0.086	0.005	0.074	0.177	106.8%
13	28-May	0.027	0.072	0.175	0.091	0.006	0.070	0.194	112.2%
14	29-May	0.028	0.098	0.200	0.109	0.008	0.054	0.226	108.3%
15	30-May	0.029	0.165	0.209	0.134	0.009	0.077	0.262	94.5%
16	31-May	0.031	0.220	0.223	0.158	0.012	0.094	0.307	94.5%
17	01-Jun	0.035	0.220	0.280	0.179	0.016	0.101	0.352	97.1%
18	02-Jun	0.035	0.246	0.331	0.204	0.023	0.095	0.411	101.3%
19	03-Jun	0.035	0.288	0.346	0.223	0.027	0.101	0.448	100.5%
20	04-Jun	0.035	0.306	0.390	0.244	0.034	0.091	0.495	103.2%
21	05-Jun	0.055	0.335	0.403	0.264	0.034	0.113	0.515	94.7%
22	06-Jun	0.090	0.373	0.403	0.289	0.030	0.147	0.523	81.1%
23	07-Jun	0.194	0.398	0.406	0.333	0.014	0.244	0.496	49.0%
24	08-Jun	0.257	0.398	0.422	0.359	0.008	0.304	0.480	33.6%
25	09-Jun	0.257	0.418	0.436	0.370	0.010	0.305	0.504	36.0%
26	10-Jun	0.357	0.460	0.447	0.421	0.003	0.341	0.497	18.0%
27	11-Jun	0.398	0.554	0.485	0.479	0.006	0.364	0.585	22.2%
28	12-Jun	0.446	0.570	0.497	0.504	0.004	0.394	0.589	16.7%
29	13-Jun	0.530	0.597	0.497	0.541	0.003	0.469	0.610	12.7%
30	14-Jun	0.594	0.626	0.544	0.588	0.002	0.553	0.644	9.5%
31	15-Jun	0.668	0.626	0.579	0.624	0.002	0.636	0.685	9.7%
32	16-Jun	0.668	0.647	0.622	0.646	0.001	0.636	0.677	4.8%
33	17-Jun	0.676	0.683	0.660	0.673	0.000	0.673	0.689	2.4%
34	18-Jun	0.680	0.702	0.696	0.693	0.000	0.693	0.708	2.3%
35	19-Jun	0.699	0.786	0.729	0.738	0.002	0.714	0.798	8.2%
36	20-Jun	0.725	0.839	0.729	0.765	0.004	0.733	0.852	11.5%
37	21-Jun	0.746	0.881	0.756	0.794	0.006	0.771	0.897	12.9%
38	22-Jun	0.764	0.881	0.767	0.804	0.004	0.804	0.895	11.3%
39	23-Jun	0.764	0.885	0.778	0.809	0.004	0.809	0.899	11.1%
40	24-Jun	0.789	0.894	0.827	0.837	0.003	0.828	0.909	8.6%
41	25-Jun	0.824	0.917	0.856	0.866	0.002	0.853	0.930	7.4%
42	26-Jun	0.844	0.955	0.880	0.893	0.003	0.883	0.970	8.6%
43	27-Jun	0.920	0.976	0.880	0.925	0.002	0.909	0.990	7.0%
44	28-Jun	0.980	1.000	0.952	0.977	0.001	0.951	1.000	3.3%
45	29-Jun	1.000	1.000	0.969	0.990	0.000	0.974	1.000	2.4%
46	30-Jun	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] $\alpha = 0.10$

APPENDIX C

Historic Migratory Timing Data for the Late Run of Kenai River Chinook Salmon.

Appendix Table C1. Cumulative proportions of catch/crew for the gill net tagging fishery from the late run, 1985-1988.

Coded Dates	Dates	Cumulative Proportions (P_t) by Year						90% CI		
		1985	1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	01-Jul	0.028	0.012	0.014	0.013	0.017	0.006	0.007	0.026	56.4%
2	02-Jul	0.053	0.067	0.030	0.024	0.043	0.040	0.020	0.067	53.9%
3	03-Jul	0.083	0.093	0.042	0.043	0.065	0.072	0.034	0.097	48.1%
4	04-Jul	0.102	0.109	0.042	0.043	0.074	0.133	0.031	0.117	58.0%
5	05-Jul	0.123	0.113	0.068	0.075	0.095	0.077	0.062	0.127	34.4%
6	06-Jul	0.141	0.119	0.087	0.088	0.109	0.070	0.078	0.140	28.5%
7	07-Jul	0.173	0.125	0.105	0.112	0.129	0.095	0.092	0.165	28.1%
8	08-Jul	0.193	0.129	0.118	0.128	0.142	0.119	0.101	0.183	28.6%
9	09-Jul	0.210	0.140	0.128	0.158	0.159	0.129	0.117	0.201	26.6%
10	10-Jul	0.236	0.152	0.140	0.186	0.178	0.183	0.128	0.229	28.2%
11	11-Jul	0.267	0.164	0.152	0.219	0.200	0.285	0.138	0.263	31.3%
12	12-Jul	0.295	0.179	0.164	0.252	0.222	0.382	0.150	0.295	32.7%
13	13-Jul	0.328	0.217	0.186	0.273	0.251	0.394	0.177	0.325	29.4%
14	14-Jul	0.379	0.248	0.205	0.309	0.285	0.573	0.196	0.374	31.2%
15	15-Jul	0.417	0.281	0.222	0.344	0.316	0.704	0.217	0.414	31.2%
16	16-Jul	0.462	0.331	0.250	0.369	0.353	0.771	0.250	0.456	29.2%
17	17-Jul	0.488	0.374	0.299	0.402	0.391	0.609	0.299	0.482	23.5%
18	18-Jul	0.499	0.395	0.329	0.451	0.418	0.535	0.332	0.504	20.5%
19	19-Jul	0.513	0.418	0.357	0.479	0.442	0.476	0.361	0.523	18.3%
20	20-Jul	0.526	0.439	0.387	0.502	0.464	0.395	0.390	0.538	15.9%
21	21-Jul	0.569	0.464	0.430	0.539	0.500	0.412	0.425	0.576	15.1%
22	22-Jul	0.599	0.488	0.470	0.559	0.529	0.368	0.458	0.600	13.5%
23	23-Jul	0.631	0.525	0.500	0.586	0.561	0.350	0.491	0.630	12.4%
24	24-Jul	0.659	0.587	0.534	0.623	0.601	0.284	0.538	0.663	10.4%
25	25-Jul	0.695	0.601	0.579	0.651	0.631	0.269	0.570	0.692	9.7%
26	26-Jul	0.726	0.626	0.617	0.675	0.661	0.253	0.602	0.720	8.9%
27	27-Jul	0.770	0.651	0.649	0.698	0.692	0.320	0.626	0.758	9.6%
28	28-Jul	0.811	0.676	0.687	0.718	0.723	0.379	0.651	0.795	10.0%
29	29-Jul	0.828	0.697	0.712	0.740	0.744	0.342	0.676	0.813	9.2%
30	30-Jul	0.868	0.725	0.752	0.757	0.776	0.398	0.701	0.850	9.6%
31	31-Jul	0.888	0.752	0.803	0.769	0.803	0.366	0.732	0.874	8.8%
32	01-Aug	0.912	0.776	0.842	0.783	0.828	0.400	0.754	0.903	9.0%
33	02-Aug	0.923	0.796	0.842	0.813	0.844	0.316	0.778	0.910	7.8%
34	03-Aug	0.932	0.827	0.865	0.849	0.868	0.208	0.815	0.922	6.2%
35	04-Aug	0.943	0.852	0.892	0.885	0.893	0.138	0.849	0.937	4.9%
36	05-Aug	0.955	0.871	0.914	0.915	0.914	0.118	0.874	0.954	4.4%
37	06-Aug	0.965	0.893	0.926	0.915	0.925	0.093	0.889	0.960	3.9%
38	07-Aug	0.987	0.914	0.946	0.915	0.941	0.117	0.901	0.981	4.3%
39	08-Aug	1.000	0.932	0.967	0.938	0.959	0.097	0.923	0.996	3.8%
40	09-Aug	1.000	0.953	0.979	0.965	0.975	0.046	0.950	1.000	2.6%
41	10-Aug	1.000	0.966	0.991	0.984	0.986	0.025	0.967	1.000	1.9%
42	11-Aug	1.000	0.972	1.000	1.000	0.993	0.021	0.976	1.000	1.7%
43	12-Aug	1.000	0.982	1.000	1.000	0.996	0.009	0.984	1.000	1.1%
44	13-Aug	1.000	0.990	1.000	1.000	0.998	0.004	0.991	1.000	0.7%
45	14-Aug	1.000	1.000	1.000	1.000	1.000	0.001	0.996	1.000	0.4%

[1] $\alpha = 0.10$

Appendix Table C2. Cumulative proportions for sonar counts of late run chinook salmon, Kenai River, 1987-1988.

Coded Dates	Dates	Cumulative Proportions [P_t] by Year 1987	1988	Mean
1	01-Jul	0.011	0.010	0.010
2	02-Jul	0.019	0.018	0.019
3	03-Jul	0.028	0.026	0.027
4	04-Jul	0.041	0.031	0.036
5	05-Jul	0.053	0.040	0.047
6	06-Jul	0.064	0.053	0.059
7	07-Jul	0.080	0.060	0.070
8	08-Jul	0.090	0.074	0.082
9	09-Jul	0.098	0.083	0.091
10	10-Jul	0.105	0.117	0.111
11	11-Jul	0.112	0.146	0.129
12	12-Jul	0.127	0.166	0.147
13	13-Jul	0.143	0.210	0.176
14	14-Jul	0.159	0.255	0.207
15	15-Jul	0.178	0.302	0.240
16	16-Jul	0.208	0.326	0.267
17	17-Jul	0.236	0.355	0.296
18	18-Jul	0.254	0.397	0.325
19	19-Jul	0.297	0.430	0.363
20	20-Jul	0.374	0.481	0.428
21	21-Jul	0.451	0.542	0.497
22	22-Jul	0.490	0.567	0.528
23	23-Jul	0.525	0.596	0.561
24	24-Jul	0.587	0.623	0.605
25	25-Jul	0.627	0.642	0.635
26	26-Jul	0.668	0.660	0.664
27	27-Jul	0.700	0.678	0.689
28	28-Jul	0.743	0.705	0.724
29	29-Jul	0.783	0.732	0.758
30	30-Jul	0.837	0.754	0.796
31	31-Jul	0.886	0.772	0.829
32	01-Aug	0.896	0.790	0.843
33	02-Aug	0.903	0.805	0.854
34	03-Aug	0.908	0.824	0.866
35	04-Aug	0.926	0.853	0.889
36	05-Aug	0.944	0.874	0.909
37	06-Aug	0.958	0.900	0.929
38	07-Aug	0.972	0.922	0.947
39	08-Aug	0.986	0.950	0.968
40	09-Aug	0.994	0.972	0.983
41	10-Aug	1.000	0.987	0.993
42	11-Aug	1.000	1.000	1.000
43	12-Aug	1.000	1.000	1.000
44	13-Aug	1.000	1.000	1.000
45	14-Aug	1.000	1.000	1.000
46	15-Aug	1.000	1.000	1.000

Appendix Table C3. Cumulative proportions for guided sport effort from the late run, 1980-1988.

Coded Dates	Dates	Daily proportions [P(t)] by Year							90% CI		
		1984	1985	1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	01-Jul	0.000	0.023	0.025	0.006	0.025	0.016	0.000	0.001	0.031	0.0%
2	02-Jul	0.014	0.029	0.039	0.028	0.045	0.031	0.000	0.020	0.043	37.2%
3	03-Jul	0.027	0.033	0.055	0.055	0.045	0.043	0.000	0.035	0.051	17.7%
4	04-Jul	0.047	0.044	0.079	0.077	0.045	0.058	0.000	0.033	0.084	43.5%
5	05-Jul	0.073	0.064	0.103	0.077	0.079	0.079	0.000	0.059	0.099	24.9%
6	06-Jul	0.123	0.087	0.103	0.077	0.111	0.100	0.000	0.076	0.124	24.0%
7	07-Jul	0.199	0.087	0.103	0.107	0.138	0.127	0.000	0.100	0.153	20.9%
8	08-Jul	0.199	0.087	0.152	0.129	0.173	0.148	0.000	0.118	0.178	20.3%
9	09-Jul	0.199	0.122	0.181	0.172	0.211	0.177	0.000	0.149	0.205	15.8%
10	10-Jul	0.252	0.169	0.206	0.204	0.211	0.208	0.000	0.203	0.213	2.4%
11	11-Jul	0.320	0.228	0.242	0.225	0.211	0.245	0.000	0.224	0.266	8.7%
12	12-Jul	0.360	0.279	0.294	0.225	0.267	0.285	0.001	0.238	0.332	16.5%
13	13-Jul	0.412	0.322	0.294	0.225	0.319	0.314	0.002	0.249	0.380	20.9%
14	14-Jul	0.484	0.322	0.294	0.308	0.374	0.356	0.002	0.299	0.414	16.2%
15	15-Jul	0.484	0.322	0.339	0.384	0.408	0.387	0.001	0.340	0.435	12.3%
16	16-Jul	0.484	0.416	0.392	0.437	0.461	0.438	0.001	0.391	0.485	10.8%
17	17-Jul	0.534	0.485	0.455	0.486	0.461	0.484	0.000	0.462	0.506	4.5%
18	18-Jul	0.609	0.530	0.510	0.538	0.461	0.530	0.002	0.477	0.582	10.0%
19	19-Jul	0.654	0.577	0.569	0.538	0.527	0.573	0.000	0.544	0.602	5.1%
20	20-Jul	0.723	0.627	0.569	0.538	0.591	0.609	0.001	0.574	0.645	5.9%
21	21-Jul	0.737	0.627	0.569	0.596	0.650	0.636	0.002	0.580	0.691	8.8%
22	22-Jul	0.737	0.627	0.617	0.630	0.685	0.659	0.001	0.610	0.708	7.4%
23	23-Jul	0.737	0.677	0.645	0.679	0.745	0.696	0.003	0.627	0.766	10.0%
24	24-Jul	0.793	0.731	0.705	0.735	0.745	0.742	0.000	0.714	0.770	3.8%
25	25-Jul	0.842	0.790	0.770	0.782	0.745	0.786	0.000	0.760	0.811	3.2%
26	26-Jul	0.874	0.841	0.829	0.782	0.807	0.826	0.001	0.795	0.858	3.8%
27	27-Jul	0.926	0.918	0.829	0.782	0.864	0.864	0.002	0.808	0.919	6.5%
28	28-Jul	0.951	0.918	0.829	0.842	0.915	0.891	0.002	0.828	0.954	7.1%
29	29-Jul	0.951	0.918	0.902	0.894	0.960	0.925	0.001	0.876	0.974	5.3%
30	30-Jul	0.951	0.960	0.961	0.944	1.000	0.963	0.001	0.924	1.000	4.0%
31	31-Jul	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] $\alpha = 0.1$

Appendix Table C4. Cumulative proportions for unguided sport effort from the late run, 1980-1988.

Coded Dates	Dates	Daily proportions [P(t)] by Year							90% CI		
		1984	1985	1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	01-Jul	0.009	0.005	0.015	0.004	0.018	0.010	0.000	0.000	0.020	0.0%
2	02-Jul	0.022	0.011	0.026	0.016	0.044	0.024	0.000	0.004	0.043	81.3%
3	03-Jul	0.040	0.013	0.046	0.053	0.069	0.044	0.000	0.028	0.060	36.1%
4	04-Jul	0.063	0.024	0.069	0.090	0.069	0.063	0.000	0.047	0.079	25.7%
5	05-Jul	0.092	0.046	0.112	0.142	0.089	0.096	0.001	0.060	0.133	37.8%
6	06-Jul	0.108	0.084	0.124	0.142	0.102	0.112	0.000	0.085	0.139	24.3%
7	07-Jul	0.163	0.102	0.124	0.162	0.123	0.135	0.000	0.105	0.165	22.4%
8	08-Jul	0.214	0.102	0.151	0.184	0.147	0.160	0.000	0.132	0.187	17.3%
9	09-Jul	0.214	0.121	0.169	0.211	0.204	0.184	0.001	0.153	0.215	16.7%
10	10-Jul	0.237	0.148	0.188	0.250	0.252	0.215	0.001	0.165	0.264	23.0%
11	11-Jul	0.260	0.180	0.209	0.299	0.252	0.240	0.002	0.179	0.302	25.6%
12	12-Jul	0.280	0.206	0.248	0.336	0.285	0.271	0.002	0.211	0.331	22.2%
13	13-Jul	0.306	0.278	0.298	0.336	0.314	0.307	0.000	0.281	0.332	8.4%
14	14-Jul	0.367	0.354	0.298	0.387	0.352	0.352	0.002	0.291	0.413	17.3%
15	15-Jul	0.431	0.354	0.350	0.418	0.384	0.387	0.001	0.341	0.433	11.9%
16	16-Jul	0.431	0.413	0.376	0.450	0.445	0.423	0.002	0.367	0.479	13.3%
17	17-Jul	0.462	0.477	0.426	0.491	0.491	0.470	0.001	0.419	0.520	10.8%
18	18-Jul	0.506	0.503	0.470	0.547	0.491	0.503	0.002	0.449	0.558	10.8%
19	19-Jul	0.556	0.525	0.525	0.595	0.583	0.557	0.001	0.506	0.608	9.1%
20	20-Jul	0.594	0.556	0.590	0.595	0.620	0.591	0.000	0.569	0.613	3.7%
21	21-Jul	0.649	0.575	0.590	0.633	0.659	0.621	0.001	0.574	0.669	7.6%
22	22-Jul	0.705	0.575	0.615	0.654	0.689	0.648	0.001	0.598	0.698	7.7%
23	23-Jul	0.705	0.616	0.649	0.686	0.741	0.679	0.002	0.616	0.742	9.3%
24	24-Jul	0.741	0.663	0.696	0.727	0.785	0.722	0.002	0.661	0.784	8.5%
25	25-Jul	0.778	0.717	0.746	0.790	0.785	0.763	0.001	0.731	0.796	4.3%
26	26-Jul	0.801	0.761	0.812	0.840	0.827	0.808	0.000	0.789	0.828	2.4%
27	27-Jul	0.842	0.845	0.874	0.840	0.858	0.852	0.000	0.829	0.874	2.6%
28	28-Jul	0.894	0.903	0.874	0.884	0.892	0.889	0.000	0.877	0.902	1.4%
29	29-Jul	0.957	0.903	0.923	0.920	0.929	0.926	0.000	0.920	0.932	0.6%
30	30-Jul	0.957	0.962	0.959	0.959	0.967	0.961	0.000	0.955	0.966	0.6%
31	31-Jul	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] $\alpha = 0.1$

Appendix Table C5. Cumulative proportions for guided sport HPUE from the late run, 1980-1988.

Coded Dates	Dates	Daily proportions [P(t)] by Year							90% CI		
		1984	1985	1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	01-Jul	0.000	0.075	0.025	0.050	0.047	0.039	0.000	0.021	0.058	0.0%
2	02-Jul	0.026	0.092	0.046	0.113	0.064	0.068	0.001	0.022	0.115	68.5%
3	03-Jul	0.091	0.118	0.079	0.182	0.064	0.107	0.004	0.020	0.194	81.7%
4	04-Jul	0.144	0.142	0.118	0.244	0.064	0.143	0.009	0.017	0.268	87.9%
5	05-Jul	0.186	0.166	0.130	0.244	0.104	0.166	0.006	0.065	0.267	60.7%
6	06-Jul	0.226	0.211	0.130	0.244	0.173	0.197	0.003	0.119	0.275	39.7%
7	07-Jul	0.264	0.211	0.130	0.298	0.201	0.221	0.007	0.107	0.336	51.8%
8	08-Jul	0.264	0.211	0.163	0.341	0.253	0.246	0.008	0.126	0.367	48.8%
9	09-Jul	0.264	0.251	0.187	0.375	0.282	0.272	0.009	0.145	0.399	46.7%
10	10-Jul	0.285	0.296	0.201	0.404	0.282	0.293	0.010	0.155	0.432	47.2%
11	11-Jul	0.301	0.346	0.246	0.417	0.282	0.318	0.008	0.196	0.440	38.3%
12	12-Jul	0.317	0.373	0.266	0.417	0.345	0.343	0.006	0.241	0.446	29.9%
13	13-Jul	0.347	0.409	0.266	0.417	0.368	0.361	0.006	0.257	0.466	29.0%
14	14-Jul	0.365	0.409	0.266	0.444	0.409	0.378	0.009	0.250	0.506	33.8%
15	15-Jul	0.365	0.409	0.313	0.470	0.468	0.405	0.008	0.283	0.527	30.2%
16	16-Jul	0.365	0.455	0.382	0.502	0.496	0.440	0.005	0.348	0.532	20.8%
17	17-Jul	0.408	0.492	0.419	0.549	0.496	0.473	0.004	0.384	0.561	18.7%
18	18-Jul	0.438	0.508	0.487	0.575	0.496	0.501	0.002	0.435	0.567	13.2%
19	19-Jul	0.481	0.533	0.519	0.575	0.542	0.530	0.001	0.492	0.568	7.2%
20	20-Jul	0.538	0.556	0.519	0.575	0.569	0.551	0.001	0.510	0.593	7.6%
21	21-Jul	0.626	0.556	0.519	0.603	0.618	0.584	0.003	0.512	0.656	12.3%
22	22-Jul	0.626	0.556	0.569	0.638	0.731	0.624	0.007	0.513	0.735	17.7%
23	23-Jul	0.626	0.661	0.593	0.703	0.805	0.678	0.011	0.534	0.822	21.2%
24	24-Jul	0.688	0.719	0.635	0.750	0.805	0.719	0.008	0.602	0.837	16.4%
25	25-Jul	0.739	0.773	0.685	0.804	0.805	0.761	0.005	0.667	0.855	12.3%
26	26-Jul	0.833	0.789	0.716	0.804	0.867	0.802	0.006	0.698	0.905	12.9%
27	27-Jul	0.901	0.859	0.716	0.804	0.901	0.836	0.009	0.710	0.962	15.1%
28	28-Jul	0.934	0.859	0.716	0.839	0.917	0.853	0.010	0.715	0.991	16.2%
29	29-Jul	0.934	0.859	0.817	0.886	0.950	0.889	0.004	0.799	0.979	10.1%
30	30-Jul	0.934	0.925	0.906	0.930	1.000	0.939	0.002	0.873	1.000	7.1%
31	31-Jul	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] a = 0.1

Appendix Table C6. Cumulative proportions for unguided sport HPUE from the late run, 1980-1988.

Coded Dates	Dates	Daily proportions [P(t)] by Year							90% CI		
		1984	1985	1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	01-Jul	0.010	0.018	0.044	0.018	0.055	0.029	0.000	0.003	0.055	0.0%
2	02-Jul	0.037	0.018	0.073	0.018	0.068	0.043	0.001	0.002	0.084	95.9%
3	03-Jul	0.072	0.028	0.096	0.121	0.078	0.079	0.000	0.050	0.108	36.6%
4	04-Jul	0.101	0.033	0.103	0.138	0.078	0.091	0.001	0.050	0.131	44.6%
5	05-Jul	0.123	0.033	0.139	0.190	0.100	0.117	0.002	0.055	0.178	52.9%
6	06-Jul	0.142	0.060	0.159	0.190	0.136	0.137	0.001	0.100	0.174	26.9%
7	07-Jul	0.154	0.075	0.159	0.229	0.171	0.157	0.001	0.107	0.208	32.2%
8	08-Jul	0.191	0.075	0.188	0.250	0.183	0.178	0.001	0.127	0.228	28.4%
9	09-Jul	0.191	0.107	0.203	0.284	0.196	0.196	0.002	0.130	0.262	33.6%
10	10-Jul	0.206	0.153	0.240	0.352	0.225	0.235	0.005	0.141	0.330	40.2%
11	11-Jul	0.221	0.214	0.315	0.358	0.225	0.267	0.005	0.174	0.359	34.6%
12	12-Jul	0.238	0.237	0.323	0.398	0.294	0.298	0.003	0.225	0.371	24.4%
13	13-Jul	0.250	0.264	0.369	0.398	0.369	0.330	0.000	0.307	0.353	6.9%
14	14-Jul	0.260	0.333	0.369	0.407	0.384	0.351	0.000	0.324	0.377	7.5%
15	15-Jul	0.288	0.333	0.476	0.455	0.441	0.399	0.000	0.375	0.423	6.0%
16	16-Jul	0.288	0.434	0.528	0.477	0.453	0.436	0.001	0.385	0.488	11.8%
17	17-Jul	0.376	0.476	0.556	0.511	0.471	0.478	0.002	0.420	0.536	12.1%
18	18-Jul	0.422	0.501	0.585	0.527	0.471	0.501	0.003	0.423	0.579	15.6%
19	19-Jul	0.466	0.501	0.604	0.550	0.502	0.525	0.003	0.456	0.594	13.2%
20	20-Jul	0.555	0.525	0.620	0.550	0.536	0.557	0.002	0.496	0.618	11.0%
21	21-Jul	0.634	0.541	0.620	0.585	0.646	0.605	0.001	0.564	0.647	6.9%
22	22-Jul	0.713	0.541	0.627	0.640	0.764	0.657	0.006	0.555	0.760	15.6%
23	23-Jul	0.713	0.621	0.658	0.662	0.794	0.690	0.006	0.585	0.794	15.2%
24	24-Jul	0.786	0.660	0.697	0.713	0.837	0.739	0.006	0.635	0.843	14.1%
25	25-Jul	0.840	0.722	0.744	0.733	0.837	0.775	0.003	0.698	0.853	10.0%
26	26-Jul	0.866	0.810	0.772	0.769	0.900	0.824	0.006	0.722	0.925	12.3%
27	27-Jul	0.890	0.857	0.812	0.769	0.913	0.848	0.005	0.748	0.948	11.8%
28	28-Jul	0.906	0.936	0.812	0.821	0.916	0.878	0.003	0.800	0.956	8.9%
29	29-Jul	0.941	0.936	0.876	0.868	0.946	0.913	0.002	0.855	0.972	6.4%
30	30-Jul	0.941	0.966	0.930	0.911	0.966	0.943	0.001	0.905	0.981	4.1%
31	31-Jul	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] a = 0.1

Appendix Table C7. Cumulative proportions for guided sport CPUE from the late run, 1980-1988.

Coded Dates	Dates	Daily proportions [P(t)] by Year							90% CI		
		1984	1985	1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	01-Jul	0.000	0.067	0.032	0.042	0.036	0.035	0.000	0.028	0.042	0.0%
2	02-Jul	0.030	0.079	0.068	0.106	0.049	0.067	0.001	0.027	0.106	59.3%
3	03-Jul	0.082	0.097	0.095	0.169	0.049	0.098	0.004	0.016	0.180	83.4%
4	04-Jul	0.129	0.114	0.141	0.234	0.049	0.133	0.009	0.008	0.259	94.2%
5	05-Jul	0.172	0.131	0.159	0.234	0.085	0.156	0.006	0.055	0.258	65.0%
6	06-Jul	0.210	0.167	0.159	0.234	0.148	0.184	0.002	0.120	0.247	34.5%
7	07-Jul	0.244	0.167	0.159	0.299	0.177	0.209	0.006	0.106	0.312	49.4%
8	08-Jul	0.244	0.167	0.204	0.333	0.217	0.233	0.005	0.136	0.330	41.7%
9	09-Jul	0.244	0.241	0.225	0.371	0.240	0.264	0.006	0.155	0.373	41.2%
10	10-Jul	0.265	0.311	0.239	0.393	0.240	0.290	0.008	0.169	0.410	41.5%
11	11-Jul	0.289	0.374	0.276	0.407	0.240	0.317	0.008	0.198	0.436	37.5%
12	12-Jul	0.307	0.396	0.294	0.407	0.301	0.341	0.004	0.255	0.427	25.1%
13	13-Jul	0.331	0.435	0.294	0.407	0.325	0.358	0.003	0.279	0.437	22.0%
14	14-Jul	0.350	0.435	0.294	0.427	0.370	0.375	0.004	0.285	0.466	24.2%
15	15-Jul	0.350	0.435	0.365	0.457	0.438	0.409	0.002	0.344	0.474	16.0%
16	16-Jul	0.350	0.503	0.451	0.490	0.461	0.451	0.000	0.424	0.478	6.0%
17	17-Jul	0.407	0.549	0.500	0.533	0.461	0.490	0.001	0.441	0.539	10.0%
18	18-Jul	0.447	0.564	0.551	0.554	0.461	0.515	0.003	0.444	0.587	13.9%
19	19-Jul	0.497	0.581	0.578	0.554	0.503	0.543	0.001	0.491	0.595	9.5%
20	20-Jul	0.561	0.600	0.578	0.554	0.531	0.565	0.001	0.533	0.597	5.7%
21	21-Jul	0.644	0.600	0.578	0.583	0.626	0.606	0.001	0.570	0.642	5.9%
22	22-Jul	0.644	0.600	0.611	0.621	0.743	0.644	0.005	0.543	0.744	15.6%
23	23-Jul	0.644	0.705	0.630	0.683	0.812	0.695	0.009	0.568	0.822	18.3%
24	24-Jul	0.714	0.754	0.660	0.725	0.812	0.733	0.006	0.629	0.837	14.2%
25	25-Jul	0.763	0.805	0.703	0.798	0.812	0.776	0.004	0.695	0.857	10.4%
26	26-Jul	0.847	0.819	0.735	0.798	0.873	0.814	0.005	0.721	0.908	11.5%
27	27-Jul	0.908	0.892	0.735	0.798	0.916	0.850	0.008	0.725	0.974	14.6%
28	28-Jul	0.937	0.892	0.735	0.849	0.928	0.868	0.009	0.737	1.000	15.2%
29	29-Jul	0.937	0.892	0.830	0.891	0.956	0.901	0.004	0.815	0.987	9.5%
30	30-Jul	0.937	0.947	0.912	0.940	1.000	0.947	0.002	0.886	1.000	6.5%
31	31-Jul	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] $a = 0.1$

Appendix Table C8. Cumulative proportions for unguided sport CPUE from the late run, 1980-1988.

Coded Dates	Dates	Daily proportions [P(t)] by Year							90% CI		
		1984	1985	1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	01-Jul	0.007	0.023	0.034	0.014	0.043	0.024	0.000	0.004	0.044	0.0%
2	02-Jul	0.029	0.023	0.050	0.014	0.053	0.034	0.000	0.004	0.063	87.5%
3	03-Jul	0.059	0.029	0.082	0.093	0.068	0.066	0.000	0.049	0.083	25.8%
4	04-Jul	0.089	0.032	0.104	0.122	0.068	0.083	0.001	0.045	0.121	45.4%
5	05-Jul	0.119	0.032	0.133	0.171	0.084	0.108	0.002	0.049	0.167	54.7%
6	06-Jul	0.144	0.050	0.163	0.171	0.127	0.131	0.001	0.099	0.163	24.3%
7	07-Jul	0.164	0.066	0.163	0.206	0.170	0.154	0.001	0.122	0.185	20.5%
8	08-Jul	0.193	0.066	0.211	0.229	0.189	0.178	0.000	0.151	0.205	15.2%
9	09-Jul	0.193	0.098	0.224	0.264	0.203	0.196	0.001	0.154	0.239	21.6%
10	10-Jul	0.205	0.149	0.244	0.317	0.244	0.232	0.002	0.174	0.289	24.8%
11	11-Jul	0.220	0.216	0.309	0.326	0.244	0.263	0.002	0.204	0.322	22.5%
12	12-Jul	0.234	0.244	0.316	0.377	0.326	0.300	0.001	0.255	0.344	14.8%
13	13-Jul	0.246	0.265	0.385	0.377	0.426	0.340	0.001	0.304	0.375	10.4%
14	14-Jul	0.254	0.338	0.385	0.397	0.444	0.364	0.001	0.321	0.406	11.6%
15	15-Jul	0.277	0.338	0.516	0.436	0.488	0.411	0.002	0.356	0.466	13.4%
16	16-Jul	0.277	0.449	0.555	0.462	0.500	0.449	0.002	0.385	0.512	14.2%
17	17-Jul	0.382	0.501	0.582	0.506	0.514	0.497	0.002	0.440	0.554	11.4%
18	18-Jul	0.446	0.524	0.602	0.525	0.514	0.522	0.002	0.457	0.587	12.5%
19	19-Jul	0.492	0.528	0.614	0.550	0.551	0.547	0.001	0.497	0.597	9.1%
20	20-Jul	0.575	0.554	0.623	0.550	0.577	0.576	0.001	0.526	0.626	8.7%
21	21-Jul	0.638	0.570	0.623	0.590	0.681	0.620	0.002	0.558	0.683	10.0%
22	22-Jul	0.723	0.570	0.633	0.639	0.783	0.670	0.007	0.554	0.785	17.2%
23	23-Jul	0.723	0.644	0.656	0.662	0.806	0.698	0.007	0.583	0.813	16.5%
24	24-Jul	0.790	0.682	0.683	0.705	0.844	0.741	0.008	0.623	0.859	16.0%
25	25-Jul	0.841	0.733	0.730	0.729	0.844	0.775	0.004	0.686	0.865	11.5%
26	26-Jul	0.876	0.809	0.754	0.770	0.910	0.824	0.007	0.707	0.941	14.2%
27	27-Jul	0.900	0.854	0.786	0.770	0.923	0.846	0.007	0.733	0.960	13.5%
28	28-Jul	0.921	0.914	0.786	0.827	0.927	0.875	0.005	0.777	0.973	11.2%
29	29-Jul	0.951	0.914	0.847	0.874	0.950	0.907	0.003	0.834	0.980	8.0%
30	30-Jul	0.951	0.970	0.921	0.914	0.972	0.945	0.001	0.903	0.988	4.5%
31	31-Jul	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] a = 0.1

Appendix Table C9. Cumulative proportions for guided sport harvest from the late run, 1980-1988.

Coded Dates	Dates	Daily proportions [P(t)] by Year							90% CI		
		1984	1985	1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	01-Jul	0.000	0.037	0.013	0.008	0.026	0.017	0.000	0.004	0.029	0.0%
2	02-Jul	0.008	0.039	0.019	0.041	0.034	0.028	0.000	0.013	0.044	54.3%
3	03-Jul	0.030	0.041	0.030	0.085	0.034	0.044	0.001	0.002	0.086	95.8%
4	04-Jul	0.055	0.047	0.049	0.118	0.034	0.061	0.002	0.000	0.122	100.8%
5	05-Jul	0.080	0.058	0.055	0.118	0.064	0.075	0.001	0.028	0.121	62.1%
6	06-Jul	0.128	0.079	0.055	0.118	0.111	0.098	0.001	0.051	0.145	48.0%
7	07-Jul	0.197	0.079	0.055	0.157	0.129	0.123	0.003	0.052	0.195	58.0%
8	08-Jul	0.197	0.079	0.088	0.179	0.169	0.142	0.002	0.075	0.210	47.6%
9	09-Jul	0.197	0.109	0.102	0.215	0.193	0.163	0.004	0.082	0.244	49.6%
10	10-Jul	0.223	0.155	0.109	0.237	0.193	0.183	0.004	0.095	0.272	48.2%
11	11-Jul	0.249	0.217	0.143	0.244	0.193	0.209	0.003	0.141	0.278	32.8%
12	12-Jul	0.264	0.248	0.164	0.244	0.271	0.238	0.003	0.162	0.314	31.8%
13	13-Jul	0.301	0.281	0.164	0.244	0.297	0.257	0.004	0.166	0.348	35.4%
14	14-Jul	0.332	0.281	0.164	0.297	0.346	0.284	0.009	0.156	0.413	45.2%
15	15-Jul	0.332	0.281	0.207	0.345	0.392	0.312	0.009	0.181	0.442	41.8%
16	16-Jul	0.332	0.374	0.283	0.387	0.424	0.360	0.005	0.261	0.459	27.6%
17	17-Jul	0.384	0.428	0.330	0.442	0.424	0.402	0.004	0.321	0.482	20.2%
18	18-Jul	0.438	0.444	0.407	0.475	0.424	0.437	0.001	0.389	0.485	11.0%
19	19-Jul	0.483	0.469	0.446	0.475	0.490	0.473	0.001	0.442	0.503	6.5%
20	20-Jul	0.578	0.493	0.446	0.475	0.529	0.504	0.002	0.447	0.561	11.4%
21	21-Jul	0.606	0.493	0.446	0.513	0.592	0.530	0.005	0.430	0.630	18.8%
22	22-Jul	0.606	0.493	0.495	0.541	0.680	0.563	0.009	0.433	0.693	23.1%
23	23-Jul	0.606	0.607	0.509	0.619	0.778	0.624	0.018	0.440	0.808	29.5%
24	24-Jul	0.688	0.675	0.561	0.682	0.778	0.677	0.012	0.529	0.825	21.9%
25	25-Jul	0.748	0.743	0.627	0.742	0.778	0.728	0.006	0.620	0.835	14.8%
26	26-Jul	0.820	0.761	0.664	0.742	0.863	0.770	0.010	0.634	0.906	17.6%
27	27-Jul	0.903	0.876	0.664	0.742	0.905	0.818	0.015	0.651	0.985	20.4%
28	28-Jul	0.924	0.876	0.664	0.794	0.923	0.836	0.017	0.660	1.000	21.0%
29	29-Jul	0.924	0.876	0.818	0.853	0.956	0.885	0.005	0.787	0.983	11.1%
30	30-Jul	0.924	0.936	0.924	0.906	1.000	0.938	0.003	0.870	1.000	7.2%
31	31-Jul	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] $a = 0.1$

Appendix Table C10. Cumulative proportions for unguided sport harvest from the late run, 1980-1988.

Coded Dates	Dates	Daily proportions [P(t)] by Year							90% CI		
		1984	1985	1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	01-Jul	0.002	0.002	0.017	0.002	0.028	0.010	0.000	0.000	0.028	0.0%
2	02-Jul	0.011	0.002	0.025	0.002	0.037	0.015	0.000	0.000	0.040	158.9%
3	03-Jul	0.027	0.002	0.037	0.102	0.044	0.043	0.001	0.000	0.091	112.8%
4	04-Jul	0.044	0.003	0.042	0.119	0.044	0.050	0.002	0.000	0.110	117.6%
5	05-Jul	0.060	0.003	0.082	0.193	0.056	0.079	0.005	0.000	0.177	125.1%
6	06-Jul	0.067	0.025	0.088	0.193	0.070	0.089	0.004	0.000	0.179	101.6%
7	07-Jul	0.083	0.031	0.088	0.213	0.090	0.101	0.005	0.004	0.198	96.2%
8	08-Jul	0.131	0.031	0.108	0.226	0.099	0.119	0.005	0.023	0.215	80.6%
9	09-Jul	0.131	0.044	0.115	0.250	0.120	0.132	0.006	0.028	0.236	78.9%
10	10-Jul	0.140	0.070	0.133	0.321	0.158	0.164	0.010	0.026	0.303	84.4%
11	11-Jul	0.149	0.112	0.174	0.328	0.158	0.184	0.009	0.057	0.312	69.3%
12	12-Jul	0.157	0.124	0.183	0.367	0.223	0.211	0.009	0.079	0.342	62.5%
13	13-Jul	0.165	0.165	0.242	0.367	0.284	0.245	0.004	0.158	0.331	35.3%
14	14-Jul	0.179	0.276	0.242	0.380	0.300	0.276	0.005	0.182	0.370	34.1%
15	15-Jul	0.225	0.276	0.385	0.419	0.351	0.331	0.001	0.285	0.378	14.0%
16	16-Jul	0.225	0.402	0.420	0.438	0.372	0.372	0.001	0.325	0.418	12.5%
17	17-Jul	0.294	0.459	0.457	0.476	0.394	0.416	0.002	0.358	0.474	14.0%
18	18-Jul	0.345	0.473	0.490	0.499	0.394	0.440	0.003	0.361	0.519	18.0%
19	19-Jul	0.401	0.473	0.516	0.529	0.476	0.479	0.001	0.441	0.516	7.8%
20	20-Jul	0.485	0.488	0.543	0.529	0.510	0.511	0.000	0.488	0.533	4.4%
21	21-Jul	0.595	0.494	0.543	0.565	0.632	0.566	0.002	0.503	0.629	11.1%
22	22-Jul	0.705	0.494	0.548	0.596	0.731	0.615	0.009	0.486	0.743	20.9%
23	23-Jul	0.705	0.565	0.574	0.615	0.774	0.646	0.011	0.504	0.789	22.1%
24	24-Jul	0.771	0.602	0.623	0.670	0.827	0.699	0.011	0.553	0.844	20.8%
25	25-Jul	0.820	0.674	0.683	0.704	0.827	0.742	0.006	0.636	0.847	14.2%
26	26-Jul	0.835	0.755	0.731	0.752	0.902	0.795	0.009	0.669	0.922	15.9%
27	27-Jul	0.860	0.838	0.794	0.752	0.913	0.831	0.007	0.719	0.944	13.6%
28	28-Jul	0.881	0.935	0.794	0.813	0.915	0.868	0.004	0.779	0.956	10.2%
29	29-Jul	0.936	0.935	0.875	0.858	0.947	0.910	0.002	0.846	0.974	7.1%
30	30-Jul	0.936	0.972	0.926	0.903	0.969	0.941	0.001	0.896	0.986	4.8%
31	31-Jul	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] $a = 0.1$

Appendix Table C11. Cumulative proportions for guided sport catch from the late run, 1980-1988.

Coded Dates	Dates	Daily proportions [P(t)] by Year							90% CI		
		1984	1985	1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	01-Jul	0.000	0.031	0.017	0.006	0.019	0.015	0.000	0.005	0.024	0.0%
2	02-Jul	0.010	0.033	0.027	0.040	0.025	0.027	0.000	0.016	0.038	40.9%
3	03-Jul	0.026	0.034	0.036	0.080	0.025	0.040	0.001	0.001	0.079	97.4%
4	04-Jul	0.047	0.038	0.059	0.114	0.025	0.057	0.002	0.000	0.118	107.2%
5	05-Jul	0.072	0.045	0.069	0.114	0.051	0.070	0.001	0.026	0.114	62.9%
6	06-Jul	0.117	0.061	0.069	0.114	0.094	0.091	0.001	0.060	0.122	34.0%
7	07-Jul	0.176	0.061	0.069	0.160	0.112	0.116	0.002	0.053	0.178	53.9%
8	08-Jul	0.176	0.061	0.114	0.179	0.141	0.134	0.001	0.091	0.178	32.6%
9	09-Jul	0.176	0.115	0.127	0.217	0.160	0.159	0.002	0.097	0.221	38.8%
10	10-Jul	0.202	0.181	0.135	0.234	0.160	0.182	0.003	0.112	0.253	38.4%
11	11-Jul	0.239	0.257	0.163	0.241	0.160	0.212	0.002	0.150	0.274	29.4%
12	12-Jul	0.256	0.280	0.182	0.241	0.234	0.238	0.001	0.195	0.282	18.2%
13	13-Jul	0.285	0.315	0.182	0.241	0.260	0.257	0.002	0.201	0.312	21.5%
14	14-Jul	0.316	0.315	0.182	0.282	0.314	0.282	0.005	0.189	0.375	33.1%
15	15-Jul	0.316	0.315	0.249	0.335	0.365	0.316	0.004	0.235	0.397	25.7%
16	16-Jul	0.316	0.443	0.345	0.377	0.391	0.375	0.001	0.342	0.407	8.6%
17	17-Jul	0.382	0.507	0.409	0.428	0.391	0.423	0.000	0.399	0.448	5.9%
18	18-Jul	0.452	0.521	0.468	0.454	0.391	0.457	0.002	0.402	0.513	12.1%
19	19-Jul	0.503	0.538	0.501	0.454	0.451	0.490	0.001	0.452	0.528	7.8%
20	20-Jul	0.606	0.557	0.501	0.454	0.489	0.521	0.001	0.488	0.554	6.3%
21	21-Jul	0.631	0.557	0.501	0.494	0.610	0.558	0.004	0.470	0.647	15.8%
22	22-Jul	0.631	0.557	0.534	0.524	0.698	0.589	0.010	0.456	0.722	22.5%
23	23-Jul	0.631	0.665	0.545	0.598	0.788	0.645	0.016	0.472	0.819	26.9%
24	24-Jul	0.721	0.719	0.583	0.654	0.788	0.693	0.011	0.552	0.835	20.4%
25	25-Jul	0.777	0.780	0.641	0.735	0.788	0.744	0.006	0.643	0.846	13.6%
26	26-Jul	0.840	0.794	0.681	0.735	0.869	0.784	0.009	0.652	0.915	16.8%
27	27-Jul	0.912	0.910	0.681	0.735	0.921	0.832	0.016	0.661	1.000	20.6%
28	28-Jul	0.929	0.910	0.681	0.809	0.935	0.853	0.016	0.680	1.000	20.2%
29	29-Jul	0.929	0.910	0.826	0.861	0.962	0.898	0.005	0.802	0.994	10.7%
30	30-Jul	0.929	0.957	0.927	0.919	1.000	0.947	0.002	0.886	1.000	6.4%
31	31-Jul	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.0%

[1] a = 0.1

Appendix Table C12. Cumulative proportions for unguided sport catch from the late run, 1980-1988.

Coded Dates	Dates	Daily proportions [P(t)] by Year							90% CI	
		1983	1984	1985	1986	1987	1988	Mean Variance	Low	High
1	01-Jul		0.002	0.002	0.013	0.001	0.021	0.008 0.000	0.000	0.022
2	02-Jul		0.009	0.002	0.017	0.001	0.029	0.012 0.000	0.000	0.031
3	03-Jul		0.023	0.003	0.034	0.077	0.039	0.035 0.001	0.004	0.067
4	04-Jul		0.040	0.003	0.048	0.106	0.039	0.047 0.001	0.000	0.096
5	05-Jul		0.061	0.003	0.080	0.173	0.048	0.073 0.004	0.000	0.161
6	06-Jul		0.072	0.018	0.089	0.173	0.064	0.083 0.003	0.006	0.160
7	07-Jul		0.100	0.024	0.089	0.191	0.090	0.099 0.003	0.019	0.179
8	08-Jul		0.137	0.024	0.122	0.205	0.102	0.118 0.003	0.045	0.191
9	09-Jul		0.137	0.038	0.128	0.230	0.124	0.131 0.004	0.050	0.212
10	10-Jul		0.144	0.066	0.138	0.283	0.178	0.162 0.006	0.060	0.263
11	11-Jul		0.153	0.112	0.174	0.295	0.178	0.182 0.005	0.089	0.275
12	12-Jul		0.160	0.127	0.180	0.344	0.256	0.213 0.007	0.102	0.324
13	13-Jul		0.168	0.159	0.270	0.344	0.336	0.255 0.002	0.200	0.310
14	14-Jul		0.180	0.276	0.270	0.370	0.356	0.290 0.003	0.217	0.364
15	15-Jul		0.218	0.276	0.444	0.402	0.395	0.347 0.001	0.311	0.383
16	16-Jul		0.218	0.414	0.470	0.424	0.415	0.388 0.001	0.348	0.428
17	17-Jul		0.301	0.484	0.505	0.471	0.433	0.439 0.001	0.390	0.488
18	18-Jul		0.372	0.497	0.528	0.499	0.433	0.466 0.002	0.400	0.532
19	19-Jul		0.430	0.499	0.545	0.530	0.529	0.507 0.000	0.495	0.518
20	20-Jul		0.509	0.516	0.559	0.530	0.556	0.534 0.000	0.513	0.556
21	21-Jul		0.598	0.522	0.559	0.571	0.669	0.584 0.004	0.502	0.666
22	22-Jul		0.718	0.522	0.566	0.598	0.754	0.632 0.010	0.495	0.768
23	23-Jul		0.718	0.587	0.586	0.617	0.787	0.659 0.012	0.512	0.806
24	24-Jul		0.778	0.625	0.619	0.663	0.834	0.704 0.013	0.550	0.858
25	25-Jul		0.826	0.683	0.679	0.704	0.834	0.745 0.007	0.632	0.858
26	26-Jul		0.846	0.754	0.719	0.757	0.912	0.798 0.010	0.659	0.936
27	27-Jul		0.871	0.833	0.770	0.757	0.923	0.831 0.008	0.706	0.956
28	28-Jul		0.898	0.907	0.770	0.823	0.927	0.865 0.006	0.757	0.973
29	29-Jul		0.946	0.907	0.847	0.867	0.951	0.904 0.003	0.829	0.978
30	30-Jul		0.946	0.975	0.917	0.908	0.974	0.944 0.001	0.896	0.992
31	31-Jul		1.000	1.000	1.000	1.000	1.000	1.000 0.000	1.000	1.000

[1] a = 0.1

Appendix Table C13. Cumulative proportions for total harvest in the Central District east-side set gill net fishery, upper Cook Inlet, 1980-1988.

Coded Dates	Dates	Daily Proportions [P_t] by Year											90% CI		
		1980	1981	1982	1983	1984	1985	1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	01-Jul	0.00	0.02	0.00	0.07	0.00	0.03	0.00	0.00	0.03	0.016	0.001	0.000	0.035	112.4%
2	02-Jul	0.00	0.04	0.04	0.07	0.05	0.03	0.00	0.00	0.03	0.029	0.001	0.010	0.048	66.4%
3	03-Jul	0.00	0.05	0.04	0.07	0.05	0.03	0.05	0.03	0.03	0.039	0.000	0.024	0.055	40.0%
4	04-Jul	0.12	0.05	0.04	0.12	0.05	0.03	0.09	0.03	0.07	0.068	0.001	0.039	0.098	43.4%
5	05-Jul	0.13	0.05	0.12	0.12	0.05	0.07	0.09	0.03	0.07	0.082	0.001	0.053	0.112	35.6%
6	06-Jul	0.13	0.18	0.12	0.24	0.17	0.07	0.09	0.06	0.07	0.127	0.004	0.078	0.175	38.1%
7	07-Jul	0.19	0.18	0.12	0.24	0.17	0.07	0.15	0.06	0.07	0.139	0.004	0.089	0.188	35.8%
8	08-Jul	0.19	0.18	0.12	0.29	0.17	0.13	0.15	0.06	0.13	0.157	0.004	0.107	0.207	31.8%
9	09-Jul	0.19	0.21	0.18	0.29	0.28	0.13	0.15	0.06	0.13	0.178	0.005	0.120	0.236	32.6%
10	10-Jul	0.19	0.28	0.18	0.29	0.32	0.20	0.15	0.10	0.18	0.209	0.005	0.152	0.266	27.2%
11	11-Jul	0.26	0.28	0.18	0.35	0.35	0.20	0.23	0.10	0.23	0.242	0.007	0.178	0.305	26.2%
12	12-Jul	0.26	0.36	0.33	0.35	0.41	0.28	0.23	0.12	0.24	0.287	0.008	0.219	0.355	23.8%
13	13-Jul	0.26	0.36	0.33	0.40	0.46	0.28	0.25	0.17	0.28	0.310	0.008	0.242	0.378	21.9%
14	14-Jul	0.42	0.44	0.33	0.43	0.46	0.28	0.36	0.18	0.29	0.353	0.008	0.282	0.425	20.3%
15	15-Jul	0.42	0.44	0.33	0.50	0.46	0.35	0.40	0.25	0.35	0.387	0.006	0.328	0.446	15.3%
16	16-Jul	0.47	0.44	0.44	0.50	0.59	0.39	0.40	0.29	0.41	0.435	0.007	0.370	0.500	14.9%
17	17-Jul	0.51	0.44	0.47	0.51	0.66	0.39	0.47	0.33	0.46	0.470	0.008	0.398	0.541	15.3%
18	18-Jul	0.51	0.44	0.51	0.56	0.78	0.40	0.51	0.33	0.49	0.505	0.016	0.407	0.603	19.4%
19	19-Jul	0.58	0.55	0.55	0.60	0.78	0.45	0.57	0.38	0.51	0.551	0.012	0.464	0.639	15.9%
20	20-Jul	0.58	0.55	0.60	0.64	0.78	0.45	0.60	0.42	0.51	0.569	0.012	0.485	0.653	14.8%
21	21-Jul	0.65	0.68	0.64	0.70	0.78	0.46	0.63	0.46	0.52	0.614	0.012	0.527	0.701	14.2%
22	22-Jul	0.72	0.69	0.68	0.74	0.78	0.49	0.65	0.49	0.58	0.645	0.011	0.563	0.727	12.7%
23	23-Jul	0.78	0.69	0.70	0.77	0.78	0.53	0.65	0.52	0.63	0.671	0.010	0.592	0.750	11.8%
24	24-Jul	0.82	0.76	0.71	0.80	0.78	0.55	0.65	0.55	0.66	0.699	0.010	0.619	0.779	11.4%
25	25-Jul	0.86	0.76	0.73	0.83	0.78	0.59	0.65	0.59	0.69	0.721	0.010	0.644	0.798	10.6%
26	26-Jul	0.86	0.76	0.75	0.86	0.78	0.63	0.72	0.64	0.74	0.750	0.007	0.685	0.816	8.7%
27	27-Jul	0.86	0.83	0.78	0.90	0.80	0.66	0.75	0.67	0.75	0.779	0.006	0.717	0.841	8.0%
28	28-Jul	0.90	0.83	0.82	0.93	0.80	0.71	0.80	0.72	0.77	0.808	0.005	0.751	0.866	7.1%
29	29-Jul	0.90	0.88	0.85	0.96	0.80	0.74	0.80	0.77	0.82	0.835	0.005	0.782	0.888	6.4%

-Continued-

Appendix Table C13. Cumulative proportions for total harvest in the Central District east-side set gill net fishery, upper Cook Inlet, 1980-1988 (continued).

Coded Dates	Dates	Daily Proportions [P_t] by Year									Mean	Variance	90% CI Low	90% CI High	Rel Pre[1]
		1980	1981	1982	1983	1984	1985	1986	1987	1988					
30	30-Jul	0.92	0.88	0.88	0.96	0.90	0.78	0.83	0.78	0.84	0.862	0.004	0.814	0.911	5.6%
31	31-Jul	0.92	0.91	0.90	0.96	0.90	0.81	0.85	0.80	0.87	0.881	0.003	0.839	0.922	4.7%
32	01-Aug	0.95	0.91	0.91	0.98	0.90	0.84	0.87	0.83	0.93	0.903	0.002	0.865	0.941	4.2%
33	02-Aug	0.95	0.91	0.94	0.98	0.90	0.88	0.89	0.86	0.93	0.916	0.001	0.887	0.945	3.2%
34	03-Aug	0.95	0.96	0.94	0.98	0.95	0.91	0.91	0.89	0.93	0.935	0.001	0.912	0.958	2.4%
35	04-Aug	0.97	0.96	0.96	0.98	0.95	0.93	0.94	0.91	0.93	0.948	0.000	0.931	0.965	1.8%
36	05-Aug	0.97	0.96	0.96	0.98	0.95	0.95	0.94	0.94	0.97	0.958	0.000	0.947	0.969	1.1%
37	06-Aug	0.97	0.96	0.97	0.98	0.98	0.98	0.95	0.97	0.97	0.970	0.000	0.963	0.976	0.7%
38	07-Aug	0.97	0.98	0.97	0.98	0.98	0.98	0.95	0.98	0.97	0.974	0.000	0.967	0.982	0.8%
39	08-Aug	0.98	0.98	0.97	0.98	0.98	0.98	0.96	0.98	0.98	0.978	0.000	0.973	0.983	0.5%
40	09-Aug	0.98	0.98	0.98	0.98	0.98	0.99	0.98	0.98	0.98	0.982	0.000	0.978	0.986	0.4%
41	10-Aug	0.98	0.99	0.98	0.99	0.99	0.99	0.99	1.00	0.98	0.989	0.000	0.984	0.993	0.5%
42	11-Aug	0.99	0.99	0.99	0.99	0.99	0.99	0.99	1.00	0.98	0.991	0.000	0.988	0.994	0.3%
43	12-Aug	0.99	0.99	0.99	1.00	0.99	1.00	0.99	1.00	0.99	0.994	0.000	0.991	0.997	0.3%
44	13-Aug	0.99	0.99	1.00	1.00	1.00	1.00	0.99	1.00	0.99	0.996	0.000	0.994	0.998	0.2%
45	14-Aug	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.99	0.998	0.000	0.996	1.000	0.2%
46	15-Aug	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.000	0.000	1.000	1.000	0.0%

[1] $a = 0.1$

Appendix Table C14. Cumulative proportions for total harvest in the Central District east-side set gill net fishery, Salamatof Beach, upper Cook Inlet, 1980-1988.

Coded Dates	Dates	Cumulative Proportions [Pt] by Year											90% CI		
		1980	1981	1982	1983	1984	1985	1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
1	01-Jul	0.00	0.00	0.00	0.07	0.00	0.03	0.00	0.00	0.04	0.015	0.001	0.000	0.035	125.7%
2	02-Jul	0.00	0.00	0.05	0.07	0.00	0.03	0.00	0.00	0.04	0.020	0.001	0.000	0.041	98.8%
3	03-Jul	0.00	0.01	0.05	0.07	0.00	0.03	0.00	0.04	0.04	0.025	0.001	0.006	0.044	75.4%
4	04-Jul	0.09	0.01	0.05	0.11	0.00	0.03	0.08	0.04	0.09	0.055	0.002	0.024	0.085	56.6%
5	05-Jul	0.09	0.01	0.09	0.11	0.00	0.09	0.08	0.04	0.09	0.066	0.002	0.034	0.098	48.7%
6	06-Jul	0.09	0.21	0.09	0.11	0.00	0.09	0.08	0.09	0.09	0.094	0.003	0.052	0.137	44.9%
7	07-Jul	0.11	0.21	0.09	0.11	0.00	0.09	0.10	0.09	0.09	0.099	0.003	0.057	0.142	42.3%
8	08-Jul	0.11	0.21	0.09	0.15	0.00	0.13	0.10	0.09	0.13	0.113	0.003	0.068	0.158	39.6%
9	09-Jul	0.11	0.21	0.12	0.15	0.13	0.13	0.10	0.09	0.13	0.130	0.001	0.102	0.159	21.7%
10	10-Jul	0.11	0.29	0.12	0.15	0.13	0.13	0.10	0.11	0.13	0.142	0.003	0.097	0.186	31.3%
11	11-Jul	0.11	0.29	0.12	0.20	0.13	0.13	0.11	0.11	0.18	0.153	0.004	0.107	0.200	30.5%
12	12-Jul	0.11	0.36	0.18	0.20	0.13	0.15	0.11	0.11	0.20	0.172	0.006	0.110	0.233	36.0%
13	13-Jul	0.11	0.36	0.18	0.20	0.16	0.15	0.11	0.16	0.23	0.184	0.006	0.124	0.243	32.4%
14	14-Jul	0.19	0.46	0.18	0.20	0.16	0.15	0.26	0.16	0.23	0.219	0.009	0.145	0.294	34.1%
15	15-Jul	0.19	0.46	0.18	0.26	0.16	0.22	0.26	0.16	0.28	0.240	0.009	0.167	0.313	30.3%
16	16-Jul	0.19	0.46	0.27	0.26	0.45	0.22	0.26	0.16	0.30	0.285	0.011	0.202	0.368	29.2%
17	17-Jul	0.19	0.46	0.27	0.27	0.45	0.22	0.26	0.21	0.34	0.295	0.010	0.217	0.374	26.6%
18	18-Jul	0.19	0.46	0.27	0.33	0.57	0.22	0.27	0.21	0.37	0.321	0.016	0.222	0.421	30.9%
19	19-Jul	0.24	0.54	0.28	0.40	0.57	0.24	0.27	0.21	0.42	0.354	0.018	0.248	0.461	30.0%
20	20-Jul	0.24	0.54	0.34	0.46	0.57	0.24	0.27	0.23	0.42	0.368	0.018	0.263	0.474	28.6%
21	21-Jul	0.35	0.68	0.37	0.63	0.57	0.24	0.32	0.24	0.43	0.424	0.027	0.295	0.554	30.5%
22	22-Jul	0.44	0.70	0.45	0.69	0.57	0.24	0.32	0.25	0.46	0.458	0.030	0.323	0.593	29.4%
23	23-Jul	0.53	0.70	0.46	0.73	0.57	0.24	0.32	0.26	0.46	0.475	0.032	0.335	0.614	29.4%
24	24-Jul	0.61	0.80	0.47	0.76	0.57	0.24	0.32	0.29	0.49	0.506	0.040	0.349	0.663	31.0%
25	25-Jul	0.71	0.80	0.50	0.81	0.57	0.25	0.32	0.33	0.52	0.534	0.044	0.369	0.698	30.8%
26	26-Jul	0.71	0.80	0.52	0.84	0.57	0.31	0.48	0.40	0.57	0.578	0.032	0.438	0.717	24.2%
27	27-Jul	0.71	0.85	0.56	0.87	0.57	0.36	0.48	0.45	0.61	0.607	0.031	0.470	0.743	22.6%
28	28-Jul	0.80	0.85	0.61	0.90	0.57	0.47	0.68	0.52	0.66	0.672	0.022	0.557	0.788	17.2%
29	29-Jul	0.80	0.90	0.67	0.93	0.57	0.57	0.68	0.56	0.72	0.711	0.019	0.602	0.820	15.4%

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Appendix Table C14. Cumulative proportions for total harvest in the Central District east-side set gill net fishery, Salamatof Beach, upper Cook Inlet, 1980-1988 (continued).

Coded Dates	Dates	Cumulative Proportions [Pt] by Year											90% CI		
		1980	1981	1982	1983	1984	1985	1986	1987	1988	Mean	Variance	Low	High	Rel Pre[1]
30	30-Jul	0.86	0.90	0.70	0.93	0.71	0.67	0.71	0.57	0.77	0.758	0.014	0.665	0.851	12.2%
31	31-Jul	0.86	0.93	0.72	0.93	0.71	0.74	0.74	0.58	0.85	0.784	0.013	0.694	0.874	11.4%
32	01-Aug	0.91	0.93	0.79	0.94	0.71	0.81	0.78	0.63	0.89	0.821	0.012	0.737	0.906	10.3%
33	02-Aug	0.91	0.93	0.88	0.94	0.71	0.87	0.82	0.72	0.89	0.853	0.008	0.784	0.921	8.1%
34	03-Aug	0.91	0.98	0.88	0.94	0.86	0.90	0.88	0.79	0.89	0.893	0.003	0.851	0.935	4.7%
35	04-Aug	0.95	0.98	0.93	0.94	0.86	0.92	0.91	0.86	0.89	0.915	0.002	0.883	0.946	3.5%
36	05-Aug	0.95	0.98	0.93	0.94	0.86	0.94	0.91	0.90	0.95	0.928	0.001	0.901	0.955	2.9%
37	06-Aug	0.95	0.98	0.95	0.94	0.92	0.97	0.93	0.94	0.95	0.947	0.000	0.933	0.961	1.5%
38	07-Aug	0.95	0.99	0.95	0.94	0.92	0.97	0.93	0.97	0.95	0.950	0.000	0.934	0.967	1.7%
39	08-Aug	0.97	0.99	0.95	0.94	0.92	0.97	0.95	0.97	0.96	0.956	0.000	0.941	0.972	1.6%
40	09-Aug	0.97	0.99	0.97	0.94	0.92	0.99	0.97	0.97	0.96	0.964	0.000	0.947	0.981	1.8%
41	10-Aug	0.97	0.99	0.97	0.98	0.97	0.99	0.98	0.99	0.96	0.978	0.000	0.971	0.986	0.8%
42	11-Aug	0.97	0.99	0.98	0.98	0.97	0.99	0.99	0.99	0.96	0.980	0.000	0.972	0.987	0.7%
43	12-Aug	0.97	0.99	0.99	1.00	0.97	1.00	0.99	0.99	0.99	0.986	0.000	0.979	0.994	0.8%
44	13-Aug	0.98	0.99	0.99	1.00	1.00	1.00	0.99	0.99	0.99	0.991	0.000	0.986	0.996	0.5%
45	14-Aug	0.99	1.00	0.99	1.00	1.00	1.00	0.99	1.00	0.99	0.995	0.000	0.991	0.999	0.4%
46	15-Aug	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.000	0.000	1.000	0.000	0.0%

[1] $a = 0.1$

Appendix Table C15. Cumulative proportions for total harvest in the Central District drift gill net fishery, upper Cook Inlet, 1980-1988.

Coded Dates	Dates	Cumulative Proportions [Pt] by Year											90% CI		
		1980	1981	1982	1983	1984	1985	1986	1987	1988	Mean	Variance	Low	High	Rel Prel
1	01-Jul	0.00	0.03	0.00	0.18	0.00	0.08	0.00	0.00	0.03	0.036	0.004	0.000	0.084	129.6%
2	02-Jul	0.12	0.04	0.06	0.18	0.17	0.08	0.00	0.00	0.03	0.077	0.005	0.025	0.130	68.2%
3	03-Jul	0.12	0.15	0.06	0.18	0.17	0.08	0.00	0.02	0.03	0.091	0.004	0.039	0.143	57.3%
4	04-Jul	0.16	0.15	0.06	0.30	0.17	0.08	0.11	0.02	0.07	0.124	0.007	0.060	0.187	51.2%
5	05-Jul	0.16	0.15	0.17	0.30	0.17	0.15	0.11	0.02	0.07	0.144	0.006	0.084	0.204	41.6%
6	06-Jul	0.19	0.67	0.17	0.47	0.35	0.15	0.11	0.05	0.07	0.248	0.043	0.085	0.411	65.5%
7	07-Jul	0.25	0.67	0.17	0.47	0.35	0.15	0.16	0.05	0.07	0.260	0.041	0.101	0.419	61.2%
8	08-Jul	0.25	0.67	0.17	0.52	0.35	0.21	0.16	0.05	0.09	0.274	0.042	0.113	0.435	58.7%
9	09-Jul	0.28	0.67	0.26	0.52	0.45	0.21	0.16	0.05	0.09	0.299	0.043	0.135	0.462	54.7%
10	10-Jul	0.28	0.70	0.26	0.52	0.53	0.24	0.16	0.07	0.14	0.321	0.045	0.155	0.487	51.7%
11	11-Jul	0.28	0.70	0.26	0.61	0.53	0.24	0.30	0.07	0.17	0.348	0.045	0.182	0.514	47.7%
12	12-Jul	0.28	0.78	0.31	0.61	0.53	0.34	0.30	0.07	0.17	0.375	0.050	0.200	0.549	46.6%
13	13-Jul	0.28	0.78	0.31	0.65	0.60	0.34	0.30	0.08	0.20	0.394	0.053	0.215	0.574	45.6%
14	14-Jul	0.30	0.79	0.31	0.65	0.60	0.34	0.40	0.08	0.20	0.409	0.052	0.230	0.588	43.8%
15	15-Jul	0.30	0.79	0.31	0.70	0.60	0.45	0.44	0.08	0.23	0.434	0.053	0.254	0.615	41.5%
16	16-Jul	0.30	0.79	0.35	0.70	0.75	0.45	0.44	0.08	0.27	0.459	0.058	0.270	0.648	41.1%
17	17-Jul	0.30	0.79	0.35	0.70	0.75	0.45	0.44	0.09	0.32	0.465	0.056	0.281	0.650	39.7%
18	18-Jul	0.30	0.79	0.35	0.72	0.84	0.45	0.47	0.09	0.34	0.483	0.063	0.286	0.680	40.8%
19	19-Jul	0.45	0.87	0.38	0.72	0.84	0.49	0.53	0.12	0.36	0.528	0.060	0.335	0.720	36.4%
20	20-Jul	0.46	0.87	0.42	0.74	0.84	0.49	0.55	0.14	0.36	0.540	0.058	0.351	0.728	34.9%
21	21-Jul	0.76	0.90	0.46	0.77	0.84	0.49	0.71	0.14	0.36	0.602	0.066	0.402	0.803	33.3%
22	22-Jul	0.76	0.90	0.48	0.81	0.84	0.49	0.71	0.19	0.50	0.630	0.053	0.449	0.811	28.7%
23	23-Jul	0.80	0.90	0.49	0.84	0.84	0.49	0.71	0.19	0.57	0.649	0.054	0.466	0.831	28.1%
24	24-Jul	0.81	0.95	0.56	0.90	0.84	0.49	0.71	0.25	0.71	0.688	0.049	0.514	0.863	25.3%
25	25-Jul	0.84	0.95	0.59	0.93	0.84	0.49	0.71	0.41	0.79	0.725	0.036	0.576	0.875	20.6%
26	26-Jul	0.84	0.95	0.75	0.94	0.84	0.55	0.81	0.41	0.90	0.775	0.033	0.633	0.917	18.3%
27	27-Jul	0.84	0.96	0.86	0.95	0.87	0.56	0.81	0.54	0.92	0.811	0.024	0.689	0.934	15.1%
28	28-Jul	0.86	0.96	0.88	0.95	0.87	0.65	0.82	0.62	0.94	0.839	0.016	0.741	0.937	11.7%
29	29-Jul	0.86	0.98	0.95	0.96	0.87	0.71	0.82	0.70	0.95	0.867	0.011	0.783	0.950	9.6%

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Appendix Table C15. Cumulative proportions for total harvest in the Central District drift gill net fishery, upper Cook Inlet, 1980-1988 (continued).

Coded Dates	Dates	Cumulative Proportions [Pt] by Year											90% CI		
		1980	1981	1982	1983	1984	1985	1986	1987	1988	Mean	Variance	Low	High	Rel Prel
30	30-Jul	0.89	0.98	0.96	0.96	0.95	0.77	0.88	0.74	0.96	0.900	0.008	0.831	0.969	7.7%
31	31-Jul	0.89	0.99	0.97	0.96	0.95	0.83	0.90	0.86	0.97	0.925	0.003	0.882	0.968	4.6%
32	01-Aug	0.96	0.99	0.97	0.98	0.95	0.87	0.94	0.91	0.98	0.950	0.002	0.919	0.981	3.2%
33	02-Aug	0.96	0.99	0.97	0.98	0.95	0.91	0.97	0.95	0.98	0.963	0.001	0.944	0.982	2.0%
34	03-Aug	0.97	0.99	0.97	0.98	0.98	0.93	0.98	0.95	0.98	0.970	0.000	0.956	0.985	1.5%
35	04-Aug	0.99	0.99	0.99	0.98	0.98	0.95	0.98	0.99	0.98	0.981	0.000	0.970	0.992	1.1%
36	05-Aug	0.99	0.99	0.99	0.98	0.98	0.97	0.98	0.99	0.99	0.985	0.000	0.979	0.992	0.6%
37	06-Aug	0.99	0.99	1.00	0.98	0.99	0.97	0.99	0.99	0.99	0.988	0.000	0.982	0.995	0.6%
38	07-Aug	0.99	1.00	1.00	0.98	0.99	0.97	0.99	1.00	0.99	0.989	0.000	0.983	0.996	0.7%
39	08-Aug	0.99	1.00	1.00	0.99	0.99	0.97	0.99	1.00	1.00	0.990	0.000	0.983	0.997	0.7%
40	09-Aug	0.99	1.00	1.00	0.99	0.99	0.99	0.99	1.00	1.00	0.993	0.000	0.990	0.997	0.3%
41	10-Aug	0.99	1.00	1.00	0.99	0.99	0.99	0.99	1.00	1.00	0.994	0.000	0.991	0.998	0.4%
42	11-Aug	0.99	1.00	1.00	0.99	0.99	0.99	1.00	1.00	1.00	0.995	0.000	0.991	0.999	0.4%
43	12-Aug	0.99	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.997	0.000	0.994	1.000	0.3%
44	13-Aug	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.998	0.000	0.996	0.000	0.2%
45	14-Aug	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.999	0.000	0.998	0.000	0.1%
46	15-Aug	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.000	0.000	1.000	1.000	0.0%

[1] a = 0.1